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by Lady E. Tenn

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Purch. 1947

DEPT. OF ENTOMOLOGY

OXF. UNIV. MUSEUM.

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[Fenn (sady Eleanor)]

(1797)

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A
SHORT HISTORY
OF
INSECTS.

FRONTISPIECE,

Explanation of the chief parts of an Insect.

*a. a. Palpi. b. b. Antennæ. c. Head. d. Thorax. e. Abdomen.
f. f. Elytra. or. Wing-Cases. g. g. Wings.*



Specimens of some kinds of ANTENNÆ,

1. Filiform. 2. Setaceous. 3. Moniliform or Bead-shaped. 4. Club-shaped. 5. Capitate. 6. Fibrile. 7. Perfoliate. 8. Pectinate.

135. e. 7


A
SHORT HISTORY
OF
INSECTS,
(EXTRACTED FROM WORKS OF CREDIT)
Designed as an
Introduction
TO THE
STUDY OF THAT BRANCH
OF
Natural History,
AND AS A
POCKET COMPANION
TO THOSE WHO VISIT THE
LEVERIAN MUSEUM.



Portwich :

PRINTED AND SOLD BY
STEVENSON AND MATCHETT,
SOLD ALSO BY BELL, NO. 148, OXFORD-STREET;
WHITE, FLEET-STREET; SCATCHERD, AVE-MARIA-
LANE; CHAMPANTE AND WHITROW, JEWRY
STREET, ALDGATE, LONDON.

103




There is not a Fly but has had

INFINITE WISDOM;

*Concerned not only in its structure,
but in its destination.*

'TIS GOD

Who gives its lustre to an Insect's wing.



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ROYAL COLLEGE OF SURGEONS OF ENGLAND

TOO glorious art Thou, O Lord, in thyself; and Thy direct rays shine too bright for our eyes.

Yet may we venture to praise Thee in thy works; and contemplate Thee at least reflected from Thy Creatures. In them we may safely behold OUR MIGHTY MAKER; and freely admire the magnificence of our GOD.

Heaven and Earth are full of His Greatness!

Were my body so large that I could sweep all the fixed stars visible from the world in a clear night; and grasp them in the hollow of my hand: and were my soul great and capacious in proportion to so vast a body; I should, notwithstanding, be infinitely too

narrow-minded to conceive His Wisdom when He formed a *Fly*;—and how then should I think of conceiving Himself?—There is no Insect so small; not even an atom of matter so minute as not to share in His attention and care:—and as to *Man*, who is a being of much greater importance; He numbers the very hairs of his head; and therefore must be supposed to care for his immortal soul with the tenderness of a most affectionate Father.

INSECTS

Waved their limber fans,
 For wings and smallest lineaments exact;
 In all their liveries decked of summer's pride,
 With spots of gold, and purple, azure and green.

PREFACE.

NATURAL HISTORY seems likely to become the amusement of our Wives and Children ; but the enormous expence of books on that subject ; and other reasons still more cogent, point out the expedience of an epitome for the use of Ladies and Young Persons : not to mention the convenience of a Manual to refresh the memory and assist the researches of an abler student :

student : How far the little work here offered to the Public may answer the wish of the compiler in supplying such a Manual it is not for that compiler to decide.

The rudiments are given ; the general manners pointed out ; and the most interesting particulars relative to the œconomy of Insects collected from our best Authors. Upon early impressions it depends whether your Son shall, through life, make it his sport to torment and destroy ; or take delight in studying the nature of Animals ; in order to discover the wisdom of God
in


in forming them :—Whether your Daughter shall feel (or at least affect) aversion and terror at the sight of an Insect which she esteems deformed; or pursue the rational amusement of learning how its seemingly mis-shapen parts are suited to the modes of life allotted by its Maker.

Who would not wish his Child to imbibe a love for such innocent amusement?—Who would not gladly infuse a taste for such laudable pursuits?

ERRATA.

PAGE	LINE
xi	8 <i>for</i> spiraculæ <i>read</i> spiracula.
xii	6 <i>for</i> or <i>read</i> like.
xiv	10 <i>for</i> is <i>read</i> it.
xviii	21 <i>for</i> 5 <i>read</i> 6.
i	4 <i>for</i> Scarabeus <i>read</i> Scarabæus.
7	17 <i>for</i> verticiliated <i>read</i> verticillated.
8	23 <i>for</i> spire <i>read</i> spine.
9	11 <i>for</i> lentiles <i>read</i> lentils.
14	2 <i>for</i> spire <i>read</i> spine.
22	8 <i>for</i> maniferæ <i>read</i> manniferæ.
29	19 after moth, <i>for</i> period <i>read</i> comma, and <i>insert</i> and.
40	11 <i>for</i> nest <i>read</i> rest.
48	18 <i>for</i> pollex <i>read</i> pollen.
—	24 <i>for</i> Ignitis <i>read</i> Ignita.
60	8 <i>for</i> Mutila <i>read</i> Mutilla.
70	5 <i>for</i> feveral <i>read</i> fevere.
84	8 <i>dele</i> of.
87	24 <i>for</i> conchareus <i>read</i> conchaceus.
93	1 <i>for</i> Scarabeus <i>read</i> Scarabæus.
103	9 <i>for</i> foreceps <i>read</i> forceps.
104	13 <i>for</i> horizontally <i>read</i> horizontal.

INSECTS.



INSECTS are so called from a separation in the middle of their bodies, whereby they are cut into two parts; which are joined together by a small ligament.

They are small animals having many feet; and breathing through pores arranged along their sides, called *spiracula*: their skin (with which they are covered as with a coat of mail) is of a hard or boney consistence; whence they are described as having their bones on the outside: it is likewise remarked, that they have no red blood; no brains; no nostrils; no ears; no eye-lids.

They are furnished with moveable antennæ (which seem to be endued with an exquisite sense of feeling,) growing from the head.

The palpi are jointed, fixed to the mouth, and generally either four or six in number; these seem to serve instead of hands to the insect, to bring other food

food to the mouth, and hold it whilst eating : The mouth is generally placed under the head, sometimes in the breast ; it is furnished with a proboscis ; an upper lip ; jaws placed transversely ; teeth ; a tongue ; and a palate : some insects have no mouth.

The stemmata, or small eyes, are three glittering convex spots placed upon the crown of the head.

Insects are the smallest of animals ; but are a powerful part of the creation ; being exceedingly formidable from their numbers.

Some are employed in preparing ; some purifying ; and others in destroying the materials on which they work.

Their influence in the œconomy of nature is very great ; they preserve a due proportion among plants ; consume what is misplaced, dead, or decayed, &c. and themselves afford nourishment to other animals ; chiefly birds :—Thus the study of Insects seems to be very important.

METAMORPHOSIS.

Insects in general undergo a material change in their form at stated periods ; there are some, though few in comparison, which burst from the egg perfectly formed ; as spiders, &c. but the greater part exist in three different states ; in the intermediate or middle state, lying as if they were dead.

The egg is deposited in a convenient place, where the worm which is to be hatched from it may find food.

From the egg is produced the larva, (called likewise grub, caterpillar, or worm) which is of a moist, or humid substance, softer and larger than the egg ; slow in its motion, and exceedingly voracious when it meets with the food to which it is most addicted ; but more temperate when obliged to put up with that of which it is less fond.

Larvæ in general, have a great many feet ; some have none. In this state they grow, and change their skin.

Larva signifies a *mask* ; and insects in the larva state are in disguise.

Some call the insect in this state *maggot* ; some *eruca*.

The pupa, or chrysalis is drier and harder than the larva ; confined in a narrow compass ; and is either naked or covered with a kind of web.

Pupa signifies doll or *baby* ; many insects in the pupa state have some resemblance to a child wrapped in swathing cloaths.

This is called by various names ; as *Aurelia*, *Bean*, *Cod*, *Cone*, *Nymph*.

The insect escaped from the second state, in which it lay concealed in a kind of prison or tomb ; appears in a more glorious one called the *perfect* state ; it is then stiled the *complete* insect ; is active, furnished with antennæ, which is generally wanted in its other forms ; and in this state it always lays its eggs.

In the perfect state many insects do not feed ; some subsist on the juice of fruit, or of flowers, which they extract with a proboscis ; or by means of a long tongue, when at rest curled up in a spiral form like the spring of a watch : some prey upon other insects ; some on dead animals ; others on plants, &c. &c. which will be remarked in the progress of the work.

S E N S E S.

Hearing.

Barbut imagined that the antennæ were the organs of hearing ; remarking, that as they were hollow and jointed, they were fitted to convey sounds in a lessened degree, best suited to the nature of the animal. But it remains doubtful for what purpose the antennæ are designed ; and after being conjectured to be the organs of smelling ; of hearing ; and by some asserted

asserted to be susceptible of the least motion of the air ; one of our latest writers on insects says ; “ We must conclude that the antennæ of insects are appropriated for some other purposes than those it is at present suspected they answer. The organs of hearing in the crab and lobster have been discovered and figures of them published : the external orifice of the organ in these animals is placed between the long and the short antennæ ; the cochlea, &c. being lodged in the upper part, which Linnæus calls the thorax, near the serrated projection at its apex.”

EYES.

The eyes are covered with a transparent, crustaceous set of lenses, to protect them, being a luminous coat of mail.

Many insects have two crescents or immoveable caps ; composing the greatest part of their head ; and containing a prodigious number of little hemispheres or round protuberances ; placed with the utmost regularity and exactness, in lines crossing each other and resembling lattice work : these are a collection of eyes.

One may see the figure of a candle multiplied almost to infinity on their surfaces ; shifting its beams into each eye according to the motion given it by the observer's hand ; and as other creatures are obliged to turn their eyes to objects, this sort have always some

or other of their eyes directed towards objects on whatever side they present themselves : all these little hemispheres are real eyes ; having in the middle of each a minute transparent lens and pupil ; through which, objects appear topsy turvey, as through a convex glass ; this becomes also a small telescope when properly placed.

Mr. Leeuwenhoek looked through the eye of an insect (with the help of a microscope) as a telescope ; and viewed the steeple of a church which was 299 feet high, and 750 feet from the place ; he could plainly see the steeple, though not apparently larger than the point of a fine needle : he likewise viewed a house, and could discern the front ; distinguish the doors and windows ; and perceive whether the windows were open or shut.

Mr. Hook computed 14000 hemispheres in the two eyes of a drone.

Mr. Leeuwenhoek reckons in each eye of the dragon fly, 12544 lenses ; or in both 25088 : the pictures of objects painted thereon must be millions of times less than the images of them pictured on the human eye. There is no doubt that insects still smaller, have eyes contrived to discern objects some thousands of times less than themselves ; for so the minute particles they feed on must certainly be. What a power then of magnifying are such eyes endowed with ! And what extraordinary discoveries might

might be made were it possible to obtain glasses through which *we* could see as *they* do.

Spiders have eight eyes; two on the top of their head, or body, (for there is no division between them, a spider having no neck) that look directly upwards; two others in front a little below these, to discover all that passes forward; and on each side a couple more; one of which points sideways forward, and the other sideways backward; so, that the insect can see almost quite round it.

As a Fly (the spider's natural prey) is extremely cautious and nimble, and comes from above; it was necessary the spider should be furnished with a quick sight; and an ability of looking upwards, forwards, and sideways, at the same time.

WINGS.

The two first orders have their wings secured by cases; called *Elytra*.

The three next orders have under wings which assist them in directing their flight.

The insects of the sixth order have but two wings; and these would be liable to be interrupted in their passage through the air, but for two balancers or poisers with which they are provided; these are called *halteres*; They are little balls or bladders set at the top of slender footstalks, moveable every way at plea-

ture ; with these they balance themselves in flight, as a rope-dancer does with his pole loaded at each end : these bladders being hollow may serve to produce sounds, and be a means of calling to each other.

LEGS AND FEET.

The legs and feet of insects are wonderful in their structure and contrivance, according to their different circumstances and necessities of life ; and afford a pleasing variety of objects for the microscope.

It is pretty to observe the sharp hooked claws, and the skinny palms of some flies ; which enable them to walk on glass and other smooth surfaces, (even with their bodies hanging downwards) by means of the pressure of the atmosphere : this they are not able to overcome in cold damp weather ; but stick fast and die. Others have a sort of sponges which preserve their claws from being broken or blunted by striking against hard bodies ; as the soft fleshy protuberances at the bottom of the feet preserve the claws of cats, &c. The spider has each foot armed with a comb ; probably to secure the 5 threads which issue from so many orifices, from tangling.

ANTENNÆ.

The antennæ are various : those of the cockchafer open and shut like the leaves of a book ; or the folds of a lady's fan.

TONGUE.

TONGUE.

The tongue of a gnat pricks like a needle, and sucks like a pump : that of some of the lepidopterous insects is curled like the spring of a watch.

JAWS.

The mandibles of the dragon-fly are naked : this little creature is far more destructive among insects than lions in the desert ; or sharks in the ocean : this ferocious animal seizes every insect which passes by it, and breaks its legs at the first bite.

MOUTHS.

The mouths of insects are in general fortified with bristles, &c. to keep out hurtful matter.

Insects which have neither palpi nor spiral tongues, have perhaps some organ concealed.

SMELLING.

The sense of smelling is perhaps situated in the palpi, which are continually in motion as if smelling and searching after food. These organs are closed to secure the creature from the inconvenience of having them stopped with filth.

EXPLANATION.

EXPLANATION.



THE parts of an Insect chiefly to be distinguished are these four: Head, Trunk, Abdomen, and Limbs. The head, thorax, and abdomen are distinct in most insects, but in the crab, and spider, the head and thorax coalesce.

The mouth consists of the clypeus, (i. e. its upper cover,) of the lips, the mandibles, the maxillæ, the galea (i. e. the covering of the back of the maxillæ,) the palpi, the spiral tongue, the proboscis, the rostrum, and the haustellum. N. B. All these parts are not found in the same insect. The lips close the undermost part of the mouth. The two mandibles, inclose the sides of the mouth *above*; and the maxillæ inclose them *beneath*.

The *Palpi* are two, four, or six.

The *Spiral Tongue* is found in the Lepidoptera class.

The *Rostrum* is a jointed sheath of one valve, containing setæ or bristles, generally three: this is found in many genera of the class Hemiptera.

The

The *Haustellum* consists of setæ, either naked, or inclosed in a sheath, which is bivalve, and without joints: this belongs to all the genera of the class Diptera.

The *Proboscis* is fleshy, with a cylindrical stem, strait, having a capitulum or knob, furnished with 2 lips, and capable of being drawn back;—this is found in many genera of the class Diptera.—The *Proboscis* differs from the *haustellum*, as it has always two lips, the *haustellum* never. The setæ of the *haustellum* often lie in the shaft or stem of the *proboscis*.

Fabricius takes the characters of his classes from the various constructions of the mouth.

His system, more modern than that of Linnæus, is much admired.

ANTENNÆ.

Are not found in the Spider, and Phalangium. Are two in general; four in Oniscus, and six in the Lobster.

Antennæ are termed filiform, or setaceous, in respect to their whole figure, the joints not being considered.

Capitate Antennæ, in different species have their capitulum or knob of different forms: this may be remarked likewise of the club-shaped, as the club is either entire, or perfoliate, &c.

The

The *Front*, is the upper part of the head, between the eyes, mouth and thorax.

The *Trunk*, situated between the head and the abdomen ; consists of the thorax, scutellum, breast, and sternum.

The *Thorax* is the upper part of the trunk.

The *Scutellum* adheres to the hinder part of the thorax, and is extended between the wings.

The *Breast* is the lower part of the trunk, corresponding to the thorax : in this, four of the feet of such insects as have six are generally inserted.

The *Sternum*, is a longitudinal line of the breast ; often sharp pointed, before and behind, as in the genus *Dytiscus*.

ABDOMEN.

Composed of rings, perforated with lateral spiracula, and fixed to the thorax.

THE LIMBS.

The *Limbs*, which adhere to the thorax and abdomen, are the tail, the sting, the feet, the wings, the halteres and the pectines.

The tail differs in proportion, figure, termination and setæ ; has no valve.

The

The sting terminates the abdomen, has two valves, puts forth a rigid, pungent bristle, varies in proportion, figure and margin.

The Feet, consist of the thigh, the tibia, and the tarsus.

The tibia is the joint between the thigh and the tarsus.

The Tarsus, generally jointed, terminates the foot.

(Geoffroy has taken his orders of insects from the joints of the tarsus.)

THE WINGS.

Are either crustaceous and sheathing, which are termed elytra; or soft, and thin, which are named especially, wings.

(Linnaeus determines the classes according to the wings.)

The Elytra sometimes coalesce, and then the lower wings and scutellum are wanting.

Deflexed wings, have the inner margin the higher.

Membranaceous, nervose wings differ in number, proportion, figure, surface, margin, &c.

Reversed wings, have the outer margin of the under pair, prominent, when the insect is at rest; as in the silk-worm moth.

HALTERES.

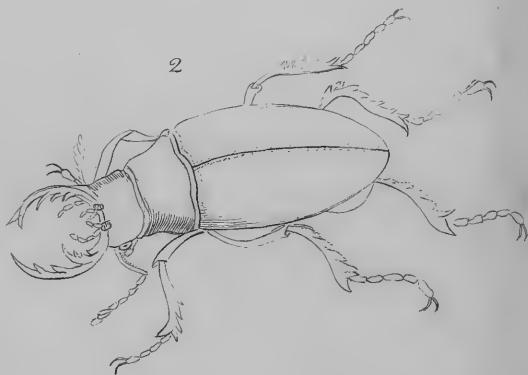
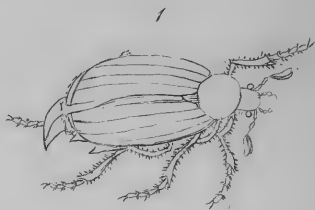
HALTERES

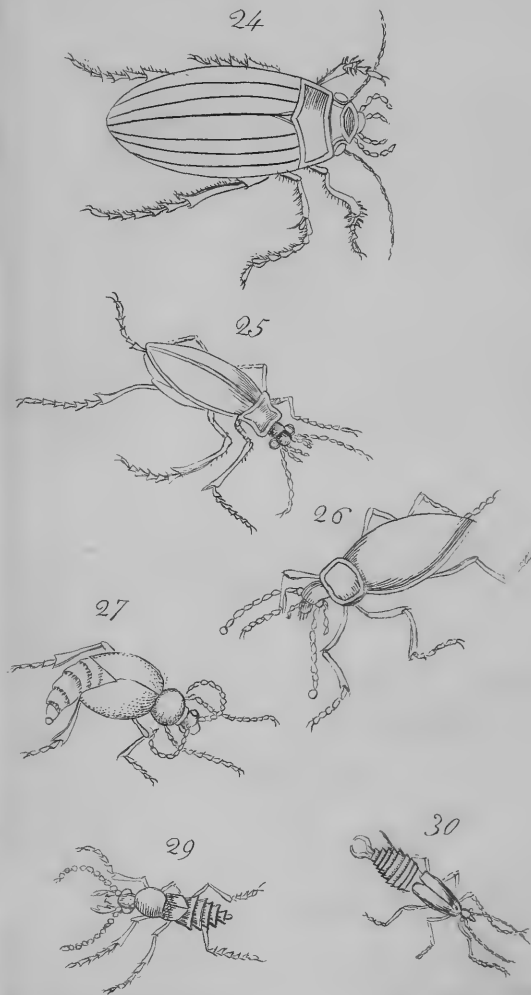
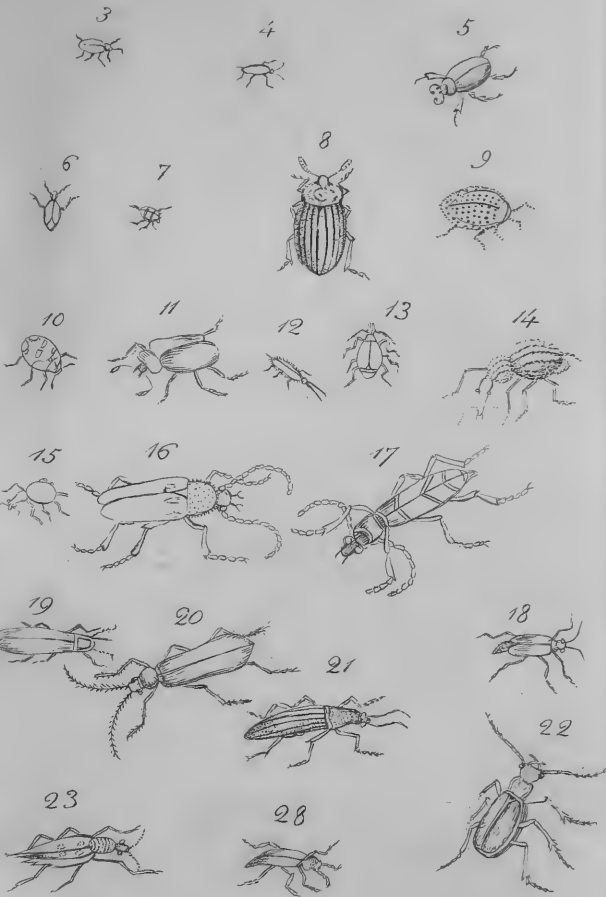
Are rudiments of posterior wings, and consist of a foot-stalk, with a little knob, or of a membranaceous arched scale ; they are peculiar to the class Diptera.

PECTINES

Are two ; adhering between the abdomen and breast, toothed on one side ; they are peculiar to the genus *Scorpio* ; the species of which are readily distinguished, according to the number of teeth in each pecten. *Use unknown.*







I.

Order—COLEOPTERA.

Wing cases like horn.

GENUS 1.—SCARABEUS BEETLE.

THE larvæ, grubs or caterpillars, of many beetles, lead a sedentary life under ground; most of them delight in and feed upon dung: some (such as the garden beetle and cock chafer) live under, and consume the roots of plants; and, in some parts of England, the latter, commonly called *Dor*, will strip the oaks almost entirely of their leaves; these are the trees which they most affect; but in seasons when the Dors abound, many other trees are despoiled.

Dor, or Cockchafer.

The grub of the chafer is three years under ground; and when it is nearly full grown, makes dreadful havock among the roots of grass and corn.

The rooks and sea-mews destroy many of these destructive larvæ, by which they render essential service to mankind, as famine must ensue if the grubs were to abound a few years in succession.

It is difficult to destroy the grubs, except by plowing the ground, to expose them to the birds. Some farmers take the pains to dig deep wherever the rooks point them out by their attempts to reach them. In the winged state, to shake the trees at noon (when the insects are asleep under the leaves) and gather them up, is the best method.

The fore legs, which are very short, are calculated for burrowing in the ground, where the female deposits her eggs.

The antennæ are very curious; folding like a fan, or the leaves of a book.

Most animals will eat them with avidity in the grub, and in the perfect state; a providential circumstance, as they are so hurtful.

Rose Chafer, or Green Beetle.

This is one of the most beautiful in England; it is green, gilded, (*auratus*) and met with upon flowers; particularly the rose and piony. The larva injures the roots of plants.

Dung Beetle.

This makes pellets of excrement, in which it deposits its eggs, and is thence called *pilularius*; as the round balls resemble pills.

Asparagus

Asparagus Beetle.

This is a very beautiful minute insect, found upon that plant when in seed: in some places it injures the plants exceedingly.

There are many more species.

GENUS 2.—LUCANUS STAG BEETLE.

This insect, the largest of any in this country, has two large moveable maxillæ (jaws) which have the appearance of stags horns: the French call it *cerf volant*.

It is found upon the oak.

The jaws are sometimes as red as coral, the female has them shorter.

A second species is smaller, and resembles the female.

The lucani feed upon the liquor which oozes from oaks; their larvæ lodge under the bark, and in the hollow of old trees which they eat into, and reduce to powder, and there turn to chrysalids.

The porrected jaws of the insect are used in stripping the bark and fixing themselves whilst they suck. The great stag pinches with his horns, and is said to hold by a small branch, and twirl himself round, probably to procure the juice, upon which he feeds.

The smaller species are common in Kent, and sometimes met with in other parts of England.

GENUS 3.—DERMESTES.

The larvæ, or maggots, of the Dermestides, feed upon the carcases of dead animals, every kind of victuals, dried skins, the bark of trees, wood and seeds; some of them make terrible havock in collections of birds, insects, herbs, &c. these last resist the usual drugs, green wax, camphor, &c. &c. but are killed by arsenic.

Dermestes Lardarius.

This is produced from the Bacon maggot, and is but too common for those who make collections of dried and preserved animals; its larva gnaws and destroys preparations of animals in collections, and even feeds upon the insects: it is also found in old bacon.

Dermestes Domesticus.

This little animal, when touched, draws in its head under its thorax; and its feet beneath the abdomen; remaining so motionless, that one would think him dead: it is the same which makes the little round holes in furniture, which reduce it to powder: and some say it is that which makes the sound called *death-watch*.

GENUS

GENUS 4.—PTINUS.

The larvæ, or maggots of the Ptini, are found in the trunks of decayed trees, in old tables, chairs, &c. some live and undergo their change among hay, dried leaves, collections of dried plants, &c.

Ptinus Pectinicornis.

This little insect is distinguished by its antennæ pectinated on one side, whence some call it feathered.

It is produced from a worm that is lodged in wood and the trunks of trees, such as the willow; where it makes deep round holes, turns to a winged insect, takes flight, and rests upon flowers.

Ptinus Pertinax.

Of a foot colour; the antennæ are filiform.

This attacks household furniture, cloaths, furs, and especially animals dried and preserved in collections of natural history; where it makes great havoc.

When caught, this insect bends back its legs, draws back its head, and shams death till it thinks itself out of danger: no force can make it move, nothing but a great degree of heat.

Linnæus accuses this insect of destroying his chairs.

GENUS 5.—HISTER.

The insects belonging to this genus, as well as their
larvæ

larvæ are frequently met with in the dung of horses, cows, &c.

GENUS 6.—GYRINUS.

Gyrinus Natator.

The *water-flea*, belonging to this genus, is of a shining black colour, is frequently seen in standing water; it describes circles on the surface, by running on it with great swiftness; is difficult to catch, plunging into the water when attempted to be taken.

The larvæ are to be met with together with those of the dytiscus, which they resemble in form, though much less.

GENUS 7.—BYRRHUS.

The larvæ are found, upon plants, or in the bodies of half-decayed animals; they often undergo their metamorphosis in the bodies of preserved insects, which they reduce to powder.

The insect is generally found upon flowers; hence is called *anthrenus*.

GENUS 8.—SYLPHA.

Many of the sylphæ are found early in the spring under the loose bark of trees; and they, as well as their larvæ feed chiefly on the half-decayed carcases of animals.

GENUS

GENUS 9.—CASSIDA.

The larvæ of the cassidæ eat the under side of the leaves of plants, and often, as it were, hide themselves under a cover of their own excrement, supported in the air above their bodies, by means of their forked tail.

Barbut says, this genus is called cassida, or *helmet* beetle, because it conceals its head under the margin of its thorax, in form of a helmet. Foreign countries afford many fine species of them. Those we meet with in these parts have that singular habit; the larva, by the help of the two prongs at its hinder extremity, makes itself, with its excrement, a kind of umbrella, that shelters it from the sun and rain: when this umbrella grows over dry, it parts with it for a new one.

Thistles and verticillated plants are inhabited by these insects. There is one species of which, the chrysalis, resembles an armorial escutcheon: it is that which produces our variegated cassida; numbers of them are found on the sides of ponds on the wild elecampane.

Cassidi Viridis.

This looks like a little tortoise.

GENUS 10.—COCCINELLA.

The larvæ of the *Coccinellæ* devour the aphides,
and

and by that means contribute to cure plants, which those insects infest, of the lousy disease.

GENUS 11.—CHRYSOMELA.

The larvæ of the Chrysomelæ consume the pulp of leaves, rejecting the fibres. This genus contains a great variety of beautiful insects. They are to be found in woods, gardens, &c. are slow in motion, and some emit an oily liquor of a disagreeable smell; some of them leap.

GENUS 12.—HISPA.

The larva seems to be yet unknown. There are but two species of the perfect insect found in Europe, and they are to be met with at the roots, or on the blades of different kinds of grass.

Hispa Atra.

Port-épine noir resembles a hedgehog in miniature: it is hard to catch, letting itself fall on the ground as soon as approached; it bears its antennæ upright before it.

GENUS 13.—BRUCHUS.

Bruchus pisi is found upon pea blossoms. The thighs of the insect have each an appendage in form of a tooth or spire.

GENUS 14.—CURCULIO.

The larvæ of the Curculiones differ not from those

those of most coleopterous insects; they have a resemblance to oblong soft worms; are provided anteriorly with six scaly legs, and their head is likewise scaly.

The Curculio is a sluggish insect, and endeavours to escape its foes by contracting its members and letting itself fall to the ground.

The larvæ of long-beaked Curculiones live in fruits, seeds of plants, and corn: of this tribe the weevil, which makes such havoc in granaries, is one.

Beans, pease, and lentiles that are preserved dry, are often spoiled by these little animals. The larvæ of short-beaked Curculiones live on leaves of plants; many pierce and lodge in stalks.

Weevil Curculio Granarius.

(See Noxious Insects.) This insect lives in and consumes corn, and comes forth a perfect insect.

Artichokes and thistles are eaten by some, and a small species consumes inwardly the leaves of elms, which appear yellow and dead at one edge, the insects consuming the Parenchyma. This species is brown, small, and hard to catch, by reason of the nimbleness with which it escapes; called, therefore, Leaping Curculio.

GENUS 15.—ATTELABUS.

Many of the insects belonging to this genus, as
well

well as their larvæ, so nearly resemble those of the preceding genus, as scarcely to be distinguished.

In their manner, way of life, &c. they exactly resemble the preceding genus, and are to be found upon many plants.

GENUS 16.—CERAMBYX CAPRICORN.

The larvæ of the Cerambyces nourish themselves with the interior substance of trees, into which they penetrate, and where they live and perform their metamorphosis.

The insect called *goat-chaffer*, or *musk-beetle*, is a cerambyx, and is found in the willow, in the Autumn; it smells of musk, some say like a rose.

Some cerambyces utter a cry.

GENUS 17.—LEPTURA.

Their larvæ are found with those of the cerambyces, and much resemble them in outward appearance and way of life.

Berkenhout has called some of the Linnæan Lepturæ, wasp-beetles. Some of them fly well, and are found in Kent in bean and pea fields, on currant bushes, and on fern.

Barbut mentions one species on the bramble, another in the trunks of decayed trees, and on the elder-trees.

GENUS

GENUS 18.—NECYDALIS CARRION EATER.

This differs from all the insects of Order I. in the wings being extended their whole length, not folded up under the elytra, which on this account seem to be of less use to this insect than to the other genera.

Barbut found in Norwood a perfect insect upon an oak-tree the beginning of August, the larva is unknown.

GENUS 19.—LAMPYRIS FIRE-FLY.

The larvæ of those lampyrides we are acquainted with, perfectly resemble the female insect, and feed upon leaves.

Lampyrus Noctiluca.

The male is a flying insect—the female is the glow-worm often seen in June. The perfect male insect flies during evening in autumn, and frequents the grassy plantations of juniper-trees, called *le ver-luisant de nuit*.

The male has four luminous spots.

GENUS 20.—CANTHARIS.

The metamorphosis of the cantharis resemble those of the cerambyx, and are found in the decayed trunk of a willow.

The insect frequents flowers.

GENUS

GENUS 21.—ELATER SKIPPER.

The larva lives and undergoes its change in the trunk of a decayed tree.

The complete insects are frequently found on flowers and plants; some of them frequent the banks of running waters, sandy banks, &c. and are pretty well known.

Laid on the back they spring a considerable height.

GENUS 22.—CICINDELA SPARKLER.

The larvæ live chiefly with those of the carabi in deep holes under ground, and as well as the perfect insects devour weaker animals for their food.

Cicindela Campestris.

This insect runs with great swiftness, and flies easily: it is found in dry sandy places in the beginning of spring, and its larva, resembling a long, soft, whitish worm, with six legs, and a brown scaly head. It makes a perpendicular round hole in the ground, and keeps its head at the entrance of the hole to catch the insects that fall into it: a spot of ground is sometimes entirely perforated in this manner. The larvæ and complete insects are perfect tigers.

GENUS 23.—BUPRESTIS COW-BURNER.

Buprestis and elater resemble one another very
much

much, and are best distinguished by the spines which terminate the breast and thorax of the latter.

There are but few species in Europe.

They are generally of bright shining colours, said to be noxious to cattle; who, in feeding happen to swallow them.

Buprestis Guttata.

This has been found in timber-yards.

The larva has not been discovered, it is supposed it may resemble that of the Elater. Each of these insects are found among timber and decayed trees.

GENUS 24.—DYTISCUS PLUNGER; OR,
DIVER.

This is a dull sluggish insect, yet swims well; using its hinder legs as oars.

The larva is frequently met with in ditches. Many species of the complete insect are common in stagnated waters, which they quit in the evening and fly about.

Some call them *water beetles*.

If two or three are kept they devour each other.

The eggs are enclosed in a kind of silky cod.

The insect is nimble to escape, and will exercise its
weapons,

weapons, griping severely with its jaws, and driving a long sharp spire into the fingers.

GENUS 25.—CARABUS BULL-HEAD.

The larvæ live in the ground, or in decayed wood, where they perform their metamorphosis: they, themselves, live chiefly upon weaker insects, or small larvæ. They are called *ground beetle*, and *blaine worm*.

One species (*carabus granulatus*) has no wings beneath the elytra, but runs very swiftly; it is large and beautiful, of a coppery green, or of a fine purple; commonly to be met with in damp places and gardens; under stones, and heaps of rotten plants.

GENUS 26.—TENEBRIO DARKLING.

The larvæ of the tenebriones are frequently met with under heaps of weeds, branches of trees, and other refuse of gardens; some of them live underground, others in neglected meal and dry bread, &c. The complete insects are found in houses, gardens, and sandy places; they run with great swiftness; and generally emit a very fœtid smell, on that account some call them stinking beetles.

One species frequently found in houses, is called the slow-legged beetle.

They eat bread, meal, &c. and shun the light; their appearance is gloomy and dark.

GENUS

GENUS 27.—MELOE BLOSSOM-EATER.

Many of them want wings. The larvæ feed chiefly on the leaves of plants; on which the compleat insects are likewise to be met with.

Meloe Proscarabeus

Black—it makes its abode on the side of wet roads, and in woods; its food, insects, violet leaves, and delicate herbs. There oozes from its body a fat unctuous matter, of an agreeable smell. Oil, in which these insects have been infused is used medicinally. Its eggs are deposited in the ground; the larvæ feed chiefly on the leaves of plants.

Meloe vesicatorius, commonly called Cantharis, or Spanish Fly, is foreign.

GENUS 28.—MORDELLA NIBBLER.

The larvæ are unknown.

The perfect insect is found upon flowers.

GENUS 29.—STAPHILINUS.

The staphilini are voracious, devouring every kind of weaker insects, and even their own species.

Some of them are found upon flowers; but they chiefly inhabit the dung of cows: their larvæ can hardly be distinguished from them, and live in humid places under ground; some call them *rove-beetles*.

These insects turn up their tail as if they meant to sting, but their weapon is of another kind; they bite and pinch with their jaws; which project, and are of use in catching prey.

The wings are large, curiously folded, and concealed under the elytra, tho' they are small. The insect unfolds and expands his wings when he chooses to fly, which he does very lightly. Several of the small species have beautiful colours.

GENUS 30.—FORFICULA EARWIG.

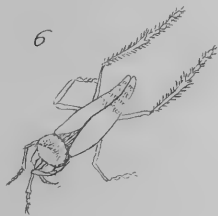
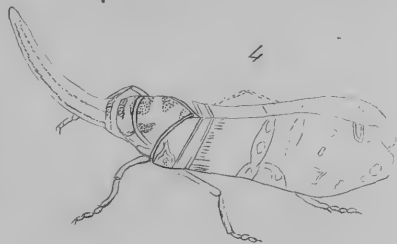
This insect is found every where in the fields, woods and gardens.

The larva differs very little from the complete insect, and is very lively, running with great agility: from the instant it leaves the egg, it continues to eat, move, leap, and pursue its prey; a skin which inclosed a part of its body and limbs bursts behind, and gives full play to the wings.

They are falsely accused of injuring mankind by entering the ear; but our gardeners have room for complaint; they live among flowers and destroy them, and they seize the fruit which other animals have begun.

The Earwig exists in its winged state but a short time.





II.

Order—HEMIPTERA.

Wing cases like bellum.



GENUS 1.—BLATTA COCKROACH.

THIS is one of those domestic insects, well known in kitchens and bake-houses ; it is broad, flat, and smooth ; it runs pretty quick : of some species the males fly.

The larva differs little from the perfect insect, except the want of wings and cases.

The larva feeds on meal, of which it is very voracious ; in the fields it will eat roots.

The Kakkerlak of the American Isles is of this genus.

They all shun the light. Ours are met with in kitchens and baker's shops ; about ovens, eating meal and dough. Smoke of charcoal destroys them.

GENUS

GENUS 2.—MANTIS SOOTHSAYER.

There are none in Britain; yet Barbut gives an account of the genus.

By some it is called Camel-Cricket; by others Creeping Leaf.

The French peasants esteem it sacred, on account of its assuming a supplicating posture. The Africans likewise revere it.

GENUS 3.—GRYLLUS CRICKET.

The larvæ very much resemble the perfect insects; and, in general, live under-ground. The chrysalids very much resemble and accompany their parents, many of which feed upon the leaves of plants; others, which live in houses, prefer bread, meal, and every kind of farinaceous substance.

They are called locusts, grasshoppers, and crickets.

The crickets are so called on account of the noise. Towards sun-set, they like best to appear out of their subterraneous habitations, making the fields ring with their cry, especially in fine summer weather.

The domestic grylli are very troublesome; but a superstitious notion, that they bring good luck, preserves them.

The smoke of charcoal will destroy them. Loud sounds will drive them away.

Gryllo-Talpa

Gryllo-Talpa, Mole-Cricket.

The fore-feet are strong and placed like those of the mole, so as to be useful in burrowing; it generally, however, moves backward. It commonly resides under ground, into which it penetrates more expeditiously than the mole.

The female forms a cell of clammy earth, about the size of a hen's egg, closed up on every side, the inside capable of receiving two hazle nuts; the eggs, amounting to about 150, are white, and about the size of caraway comfits; they are carefully covered, as well to defend them from the injuries of the weather, as from the attacks of the black beetle. The female places herself near the entrance of the nest, and whenever the beetle attempts to seize its prey, the guardian insect catches it behind, and bites it asunder. Nothing can exceed the care of these animals in the preservation of their young; wherever a nest is situated, fortifications, avenues, and entrenchments surround it; there are also numerous meanders which lead to it, and a ditch encompasses the whole, which few other insects are capable of passing.

The mole-cricket removes the nest higher or lower, according to the weather.

This creature makes great havoc in hot-beds, hacking and gnawing the roots: its fore-feet, which are armed with teeth, like a saw, are employed for that use.

Grasshopper.

Grasshopper.

The male only is vocal. Two of these little animals will vie with each other, and after a long contention in singing, meet and fight desperately.

The female has an instrument, with which she pierces the ground to deposit her eggs.

Grasshoppers have several stomachs: some authors think that they chew the cud.

The domestic and the field gryllus are the same species; the colours are different: the former being of a rusty brown, live chiefly in the dark, and those who would take them need only to light a candle suddenly, by which they will be so dazzled and bewildered, as to be incapable of finding their retreat; they are fond of sugar, never drink, love warmth, and eat bread, flour, &c.

Locusts.

These are only occasional visitors in our happy country, therefore their history cannot be properly admitted at any length; yet,

They are so frequently mentioned in Holy Scripture, that we feel peculiarly interested about them. They are compared to an army, whose numbers are almost infinite, and described as rising out of the earth, and pursuing a settled march, purposely to destroy

destroy the fruits of the earth, and co-operate with the Divine Vengeance.

They fly in such multitudes, as to appear like a cloud and darken the sun; they ravage the meadows and pasture-grounds, strip the trees of their leaves, and even bark them.

In 1748, the great brown locust visited England. They are a most formidable species, and multiply exceedingly: happily for us, the coldness of our climate, and humidity of our soil, are by no means favourable to their production; and as they are the creatures of but one year, they visit us and die at the end of the season.

GENUS 4.—FULGORA LANTERN-FLY.

Two different species have been caught in this country; but as Barbut was not able to procure one, he gave the figure of a foreign one.

The foreheads of many (especially those found in China) emit a very lively shining light in the night; some say sufficient to read by: it is not known that the European fulgoræ possess that quality.

The larvæ are not known.

GENUS 5.—CICADA. FROGHOPPER: OR, FLEA-LOCUST.

The pupæ or chrysalids of many of these, differ from the perfect insect only in the shortness of their
elytra

elytra and wings: they run and leap upon plants and flowers with great agility.

They are divided into five families.

The larvæ of one set (*ranatræ*) discharge from their bodies a kind of froth, under which they conceal themselves from the rapacity of such stronger insects as prey upon them, and from the scorching heat. Another set (*maniferæ*) pass a year under ground: these make a noise like crickets.

GENUS 6.—NOTONECTA. BOAT-FLY.

This insect is not uncommon in standing waters: when it swims on its back, the hinder feet, longer than the rest, serving it as paddles; it is very nimble, and dives when you go to take hold of it, after which it rises again to the surface. It must be cautiously handled, for the point of its rostrum is very sharp.

The larva very much resembles the perfect insect.

GENUS 7.—NEPA. WATER-SCORPION.

We have but three species of this genus; all found in the water, as well as their larvæ and chrysalids.

The insect sinks its eggs into the stalk of a bull-rush, or some other water-plant, so that the egg lies concealed, and only the hairs or bristles at the end stick out. One may perceive in water these stalks
loaded

loaded with eggs, and see the larvæ hatched under one's roof.

These insects are voracious, and feed on other aquatic animals, which they pierce and tear with their sharp rostrum, while they hold them with the forceps of their forefeet, which, some say, are their antennæ. They fly well, and remove in the night, when the pool begins to dry.

GENUS 8.—CIMEX. BUG.

The larvæ of the cimices run about, and, like the complete insect, suck in their food through their beak: many of them live upon the juices of plants; others upon the blood of animals; some are found in the waters; and others frequent houses, among which is the *bed-bug*.

They differ from other insects in their softness, and most of them emit a very foetid smell.

The bed-bug is said sometimes to have wings.

Spiders are fond of bed-bugs.

GENUS 9.—APHIS. PLANT-LOUSE.

These insects bring forth live young in summer; in autumn lay eggs. They have either four erect wings, or are without wings. They have two beaks, one in the breast, and one in the head; some are provided with two horns on their hinder parts:
small

small drops of sweet water issue from them, which attracts the ants. Many are covered with a white powder.

The larva, chrysalis, and perfect insect, cannot be distinguished.

Aphides are devoured by the larvæ of the myrmelcon formicarium of Linnæus. Ants are very fond of them. The best way of destroying them is, to put on the trees larvæ of the plant-louse lion; or, aphidivorous flies.

GENUS 10.—CHERMES.

The larvæ of the chermes have six feet; resemble the perfect insect; and are generally covered with a hairy or wooly substance.

The winged insects leap and spring with great agility; and infest a great number of different trees and plants.

The females insert their eggs under the surface of the leaves by means of a tube, and cause the little tubercles, or galls, with which the leaves of the ash, the fir, and other trees, are sometimes almost wholly covered; the largest infest the fig: it is brown above, greenish beneath, the wings large, and placed so as to form together an acute roof.

The fir-tree chermes produces that enormous scaly protuberance that is to be found at the summit of
the

the branches of that tree : the young larvæ shelter themselves in cells contained in the tumour. The white down, under which the larvæ of the pine-chermes is found, seems to be produced much in the same manner. That of the box-tree produces no tubercles, but its punctures make the leaves bend and grow hollow, in the shape of a cup. Both larva and chrysalis eject a white sweet-tasted matter, not unlike manna : it is found in small white grains.

The plate is magnified.

GENUS 11.—COCCUS. COCHINEAL.

The males have two erect wings ; the females are without.

The females fix themselves and adhere almost immovably to the roots, and sometimes to the branches of plants ; some of them having thus fixed themselves, lose entirely the form and appearance of insects ; their bodies swell, their skin stretches and becomes smooth, and they so much resemble some kinds of galls or excrescences found frequently on the leaves and branches of plants, that, in general, they are mistaken for such ; after which change, the abdomen serves only for a kind of covering or shell, under which the eggs are concealed. Geoffroy calls these *chermes*.

Others again (though they likewise fix themselves, and adhere immovably to the leaves of plants) pre-
D
serve

serve the form of insects till they have laid their eggs, and perish. (These he calls *cocci*.)

A kind of down or cotton grows out of their belly, which serves as a nest, in which they deposit their eggs.

The coccus of the phalaris contrives along the stalks of the dog-grass little nests, of a white cottony substance, in which she lays her eggs.

Most of the cochineals found in hot-houses have been brought over with exotic plants.

The green-house bug, found on orange trees, &c. is probably a coccus; it sticks close and sucks the juice; it can thrust out its legs and move. The male is a winged insect.

Cochineal, which is so useful in dying, and to the painters as carmine, is found on the Racket, otherwise called Nopal, Cardassia, Indian Fig, and *Opuntia*.

The drug might be prepared from the Indian Fig, or Coccus, purer than what the insect itself, which feeds upon it, affords.

We might, perhaps, make something of our European cochineal, which bears great resemblance to the American.

It is computed that there are imported yearly into Europe, in the course of trade, eight hundred and eighty thousand pounds of cochineal.

The plate is magnified.

GENUS 12.—THRIPS.

These insects are very common on flowers, upon which they run, or rather leap, with great vivacity, often bending their bodies upwards. Their habitation is often under the bark of trees.

The larvæ run as briskly as themselves, and are often of a red colour.

The thrips are so diminutive, that Barbut draws them as they appear in a microscope, the animals themselves would be rather taken for atoms.

Gardiners assert that they are hurtful.

III.

Order—*LEPIDOPTERA*.

With four tiled Wings.—Mouth with a Spiral Tongue.



GENUS 1.—*PAPILIO*, BUTTERFLY.

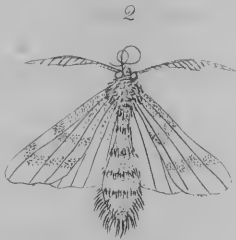
THE antennæ are thicker towards their extremity, and mostly terminated by a head; their wings, when at rest, erect: they fly in the day.

The pupæ of all butterflies are obtestæ and naked, and except those of the *Danai Candidi*, are suspended perpendicularly in the open air, being attached by their tail to the under-sides of branches of trees, leaves of plants, &c. The caterpillars of some of the equites have two horns in their necks, which they shoot out or draw in at pleasure.

GENUS 2.—*SHINX*.

Antennæ thickest in the middle, wings deflected, flight slow and heavy; they fly either early in the morning, or after sun-set; often emit a sound.

They



They suck the nectar of flowers with their tongues, though they seldom settle upon them.

Most of them undergo their metamorphosis in the earth; their chrysalids are obtestæ, but enclosed in a kind of covering or web, composed of coarse materials, in which particular they differ entirely from the preceding genus.

The bodies of most of the caterpillars are smooth, or without hair, and have a horn or spine on the hinder parts. *Hawk-moths.*

GENUS 3.—PHALENA, MOTH.

Antennæ lessen towards the point, wings generally deflected when at rest; they fly in the night.

The chrysalids are either concealed in the ground, or protected from the inclemency of the weather by a covering, which some of them, as the silk-worm, compose of the richest materials; they are either simple, or have a kind of hook at their extremity.

Phalena sarcitella, or cloaths-moth. *Phalena tapetzella* are very destructive to woollen cloths, forming for themselves a covering, in the aurelia state, from them.

CATERPILLARS;

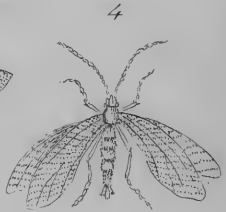
CATERPILLARS:

Or LARVÆ of the Lepidoptera Order.

Those of the tincæ keep always under some kind of covering, where they live and feed in security; some of them roll up the leaves of plants for their habitation; others, which feed only upon the interior surface of leaves, lodge themselves under the epidermis or exterior skin; others again in woollen cloths, skins of beasts and birds, &c. These all undergo their metamorphosis in the places, and under the coverings in which they had lived; some few live in society, under a kind of web formed by their joint industry; the moths which are produced from these last, have generally expanded wings.

Those of the tortrices roll up and fasten together by a thread the leaves of the plants upon which they feed, thus securing to themselves a kind of retreat.

Caterpillars which live on leaves, have many of them the power of spinning threads, which enables them to remove and prevents falling. Others have hairs, which serve to break the force of the shocks they are liable to receive; they serve too, perhaps, to give them timely notice of the approach of danger, that they may remove from it. Their colours often resemble that of their habitation; those which feed on the apple tree, are brown, like the wood; on any alarm, they quit the leaves, and trail to the branches for concealment from the birds, &c.



IV.

*Order—NEUROPTERA.**Baked wings, &c. no. sting.*

GENUS 1.—LIBELLULA DRAGON-FLY.

THE largest is produced from a water-worm that has six feet; which, whilst yet young, and very small, is transformed to a chrysalis, that has its dwelling in the water, it wears a mask, and this fastened to the insect's neck, and which it moves at will, serves to hold his prey while he devours it.

The libellulæ which have wings extended horizontally when at rest; live chiefly upon moths, &c. Those which have their wings placed at a distance from each other, the wings erect, and the eyes very prominent, upon muscæ or flies.

They are all exceedingly voracious. Linnæus calls them the hawks of gymnopterous insects. The larvæ of both live and run, rather than swim, in the water; they devour aquatic insects weaker than themselves, and are not less voracious than the compleat insects; they are likewise cruel, killing and tearing other insects,

insects, when not pressed by hunger ; since they leave the carcase entire.

The chrysalis differs very little from the larva, and like it runs with great agility in the water, devouring smaller insects. It generally quits the water before it undergoes its final chngement. Called by some *adderbolts*.—See part 1. JAW'S.

GENUS 2.—EPHEMERA, DAY-FLY.

These differ in many particulars from all other insects ; their caterpillars live in the water, where earth and clay seem to be their only nourishment, for three whole years, the time they consume in preparing for their metamorphosis, which they undergo and perform in a few moments. The larva, when ready to quit that state, arises to the surface of the water, and getting instantaneously rid of his skin, becomes a chrysalis. This chrysalis is furnished with wings, which it makes use of to fly to the first tree or wall it meets, and there settling, in the same moment quits a second skin, and becomes a perfect ephemera ; in which state they live a very short time, some not above half an hour. Their flight is slow and heavy, which renders them an easy prey to swallows, &c. The antennæ resemble hairs.

When at rest the forelegs are advanced before the head.

The

The ephemeræ are very frequent near waters; they multiply amazingly in some places; about Laß, in Carniole, a province in Germany, they are so numerous in the month of June, that they are used as manure, and the peasants think less than 20 cart loads a bad harvest.

It is those species which live some days, that fly to a tree where they sometimes are employed 24 hours in the operation of divesting themselves of a slough.

The ephemeræ in the larva and chrysalis state, have fringes of hair, which, when put into motion, serve them as fins. Nothing can be more curious than the plying of these little oars in the water. Their abdomen is terminated as well as in their state of flies, by three threads. These larvæ scoop themselves out dwellings in the banks of rivers, and they are small tubes made like siphons, the one serving for an entrance, the other affording them an outlet. The banks of some rivers are often full of them. When the waters decrease they dig fresh holes lower down, in order to enjoy their element the water.

The ephemeræ of the Rhine appear in the air two hours before sun-set.

These flies are hatched almost all at the same instant, in such numbers as to darken the air.

The most early of those on the Marne and Seine, in France, do not begin to fly till two hours after
the

the setting of the sun, towards the middle of August.

The females, by the help of the threads of their tail, and the flapping of their wings, support themselves on the surface of the water, and in that almost upright situation, drop their eggs in clusters: one will lay seven or eight hundred, which sink to the bottom. The larvæ supply food for fish.

They are called with us *May-flies*.

GENUS 3.—PHRYGANEÆ.

The lesser Phryganææ resemble the Tinex so much as not to be distinguished without difficulty; but the wings of the former are covered with hairs, instead of the scales which adorn the wings of the Tinææ.

The larvæ belonging to this genus, live in the water in tubes of filk, covered on the outside with small pieces of wood, sand, gravel, leaves of plants, &c. nay, sometimes the larva attaches to its tube the smaller testaceous animals, yet alive, with their shells, and drags them about with it: they contrive to make their habitations nearly in equilibrium with the water, when too heavy they add a bit of wood or straw, when too light a bit of gravel; when the hexapod is about to change to a chrysalis, he stops up the opening of his tube, with threads of a loose texture, through which the water makes its way, but the approach of voracious insects is prevented. The
chrysalis.

chrysalis is covered with a thin gauze, through which the new form of the insect is easily discerned. The Phryganea, on the point of changing its element, rises to the surface of the water, leaves its tube, rises into the air, and flutters upon flowers and trees; but generally settles on the sides of walls, branches of trees, &c. which are least exposed to the sun: whose influence they seem to dread, seldom flying in the day-time.

Swallows feed upon them.

Some larvæ are found in stagnating waters, where they wrap themselves up in the water lentil, cut out into regular squares, and fitted one to another. Trouts are very greedy of these larvæ; they are often stripped of their coats, and used as baits. The common ones are much sought after by fishermen, and called *stone* or *cod-bait*.

The *Phryganea bicauda* carries its eggs in a cluster as some spiders do.

The perfect insect is called *spring-fly*.

GENUS 4.—HEMEROBIUS.

This insect takes its name from the shortness of its life; which, however, continues several days.

In the state of larva it is a great devourer of plant-lice, for which it has had the appellation of *Lion of the plant-lice* bestowed upon it. The hemerobii,
even

even after their transformation, preserve their carnivorous inclination; not satisfied with making war upon the plant-lice, they do not spare each other.

The eggs of this insect are borne upon small pedicles, which are nothing but a gum spun out by the hemerobius; the egg remaining fastened to the upper part of the thread: these eggs are deposited upon leaves, and set in the form of bunches; they have been taken for parasitic plants. The larva when hatched, finds there its food, in the midst of plant-lice: in fifteen or sixteen days it has attained to its full growth. With its spinning-wheel at its tail it makes itself a small, round, white, filky cod, of a close texture. In summer, at the end of three weeks, the hemerobius issues forth with its wings; but when the cod has not been spun till autumn, the chrysalis remains in it the whole winter; and does not undergo its final metamorphosis till the ensuing spring.

The flight of this insect is heavy: some species have an excrementitious smell.

One goes by the name of water-hemerobius, because it lives mostly at the water-side.

These insects have been known to spin their filky substance so as to cover a large shrub; and the silk has been strong enough to bear winding upon a bottom of card.

One species goes by the name of *hemerobius perla*, or *golden eye*. Its wings resemble green gauze.

GENUS V.—MYRMELEON ANT-EATER.

The larva feeds chiefly upon ants : the perfect insect is very rare ; but is sometimes met with in sandy places, and near rivulets.

This is called *Formica-leo*, or *lion-ant*.

Few insects have stratagems and little wiles that afford greater entertainment, or subject of curiosity.

The larva is hatched in a fine dry sand, in a place sheltered from rain, either within a cleft of a wall, or of the ground, or at the foot of a wall, generally exposed to the south-sun. There the larvæ of the ant-eaters are hatched, and make their usual abode. Their colour is grey, and their body, which is covered with small protuberances, is of an oval form : its posterior extremity terminates in a point, and is of use to the insect to sink itself down into the sand, for they only walk retrogressively, though furnished with six feet. Before the head is placed a dentated forceps, sharp and hollow within, with which this larva catches and sucks flies and other insects, but especially ants. This forceps serves as a mouth or rostrum, as well as for an offensive weapon ; in the same manner as that of the hemerobius. The animal's

animal's retrograde motion does not allow it to run after the insects on which it feeds; but it uses stratagem.

It dives down into the sand, and turning about in a circle, hollows out concentric furrows, and gradually deeper and deeper, casting at a distance with its horns the sand it takes from that place. At length it manages to dig a hole in shape like a funnel, at the bottom of which it takes its station, concealed in the sand, nothing but the open expanded forceps appearing above it. Mischievous overtakes every insect that happens to fall into that hole: the myrmeleon, who is apprized of it by the grains of sand rolling down to the bottom, overwhelms him with a shower of dust, which it ejects with its horns, then drags the insect to the bottom of the hole, where it seizes him with its forceps, and sucks his vitals. It does not even spare other myrmeleons, who chance to fall in. When the larva is come to its full growth; it spins itself a cocoon, shaped like a ball; silky within and sand without; within it turns to a chrysalis.

GENUS 6.—PANORPA.

The complete insect is very common in the fields during the summer season; but the larva and chrysalis are unknown.

The end of its tail turned up in a threatening manner, terminating in a kind of forceps, and appearing

pearing like a scorpion's sting; does no mischief; but has gained it the name of *scorpion-fly*.

Barbut says it is found in meadows, by the side of ditches.

GENUS 7.—RHAPHIDIA.

This is rarely to be met with; it is chiefly found in woods and hedges.

The larva has not been described. Barbut knows but one species. *Serpent-headed*.

It has an oblong head, shaped like a heart; it resembles a snake.



V.

Order—HYMENOPTERA.

Naked Wings, and a Sting.



GENUS 1.—CYNIPS GALL-FLY.

Cynips Quercus Folia.

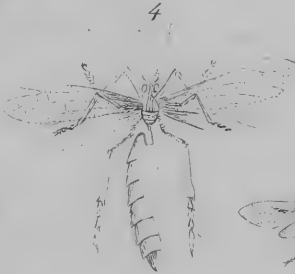
IT is in the little smooth, round, hard galls, found under the oak leaves, generally fastened to the fibres, that this insect is produced; a single one in each gall.

These latter are ligneous, of a hard, compact substance, formed like the nest, by the extravasation of the sap of the leaf, occasioned by the puncture of the gall-fly, when it deposits its eggs.

(Sometimes an ichneumon lays its egg in the tender gall; and the larva devours that of the cynips.)

Cynips

ORDER, V.



Cynips quercus gemmæ.

It deposits its eggs in the oak buds, which produces one of the finest galls, leafed like a rose-bud beginning to blow. When the gall is small, that great quantity of leaves is compressed, and they are set one upon another, like the tiles of a roof. In the centre of the gall there is a kind of ligneous kernel, in the middle of which is a cavity; and in that is found the little larva, who feeds there, takes its growth, undergoes its metamorphosis, and breaks through the inclosure of that kind of cod, in order to get out. The whole gall is often near an inch in diameter, sometimes more when dried and displayed; and it holds to the branch by a pedicle.

Our oaks give food and lodging to a multitude of insects. Not less than fifty creatures of this tribe live in and on it.

The round balls we see upon the oak leaves in June, on our woods, as big as nutmegs, green, with a blush of red, and soft to the touch, are the same kind of leaf galls with which the Norway ink, which excels that of the whole world in colour, clearness, and permanency, is made: and we have nearly the same insect that produced them; it has been caught in Bushy Park.

The

The gall insect penetrates the bark or spot which begins to bud, and there sheds a drop of corrosive fluid, lays its egg and dies; the heart of the bud being thus wounded, the circulation of the nutritive juices is interrupted, and the fermentation thereof, with the poison injected by the fly, burns the adjacent parts, and alters the natural colour of the plant; the juice or sap turned back from its natural course, gives rise to what we call the gall-nut.

GENUS 2.—TENTHREDO, SAW-FLY.

Numerous are the species of the tenthredines; they are not very shy. Some, by mean of their saw, deposit in the buds of flowers, others on the twigs of trees or shrubs, eggs, from which are produced false caterpillars. The implement with which they are armed is not very formidable, as it appears destined only to the purpose of depositing their eggs.

False caterpillars are distinguished by the number of feet, being generally from eighteen to twenty-two; those of the true never exceed sixteen, and are seldom so numerous.

The larvæ of the tenthredines feed chiefly upon the rose and willow tree, and undergo their last change in the earth; their shroud or web resembles net-work, being composed of large filken threads, between each of which great spaces are left, perhaps, to let the humidity of the earth pierce to the chrysalis: *it is very difficult to keep them in a proper*

proper state in boxes. Geoffroy reared but five or six, out of three hundred.

From the formation of its sting, which differs from that of all other insects, (those of the following genus only excepted) some English authors name this insect *saw-fly*.

GENUS 3.—SIREX, TAILED WASP.

The female lays her eggs in the interior of decayed trees: the larvæ most probably feed upon the wood, and always undergo their last metamorphosis in the place where they had lived while in the caterpillar state.

The firex is rare to be met with, but several species have been caught in England.

Sirex Gigas.

This is the species which is described in Barbut.

GENUS 4.—ICHNEUMON.

One character of these flies is, the almost continual agitation of their antennæ; another, the abdomen being generally joined to the body by a stalk or pedicle.

The name of ichneumon has been applied to them from the service they do us, by destroying caterpillars, plant-lice, and other insects, as the ichneumon, or mangouste, destroys the crocodiles.

The

The posterior part of the female is armed with a whimble, visible in some species, and that instrument, though so fine, is able to penetrate through mortar and plaster; the structure of it is more easily seen in the long-whimbled fly. The food of the family, to be produced by this fly, is the larva of wasps, or mason-bees; for it no sooner espies one of those nests, but it fixes on it with its whimble, and bores through the mortar of which it is built.

Some agglutinate their eggs upon caterpillars; others penetrate through the egg, though very hard, and deposit their own in the inside. When the larva is hatched, its head is so situated, that it pierces the caterpillar and penetrates to its very entrails. These larvæ pump out the nutritious juices of the caterpillar, without attacking the vitals of the creature, who appears healthy, and even sometimes transforms itself to a chrysalis.

The ichneumons performed special service in the years 1731 and 1732, by multiplying in the same proportion as the caterpillars; their larvæ destroying more of them than could be effected by human industry.

The larvæ, when on the point of turning into chrysalids, spin a silken cod; these cods leap.

Plant-lice, the larvæ of the curculiones, and spider's eggs, are also sometimes the cradle of the ichneumon.

Carcafes of the plant-lice, void of motion, are often found on rofe-tree leaves; they are the habitation of a fmall larva, which, after having eaten up the entrails, performs its metamorphofis under fhelter of the pellicule which unfolds it, contrives itfelf a fmall circular outlet, and fallies forth into the open air.

There are ichneumons in the woods, who dare attack fpiders.

Others, deftitute of wings, (females) depofit their eggs in fpider's nefts.

The ichneumon of the bedeguar, (or fweet-briar fponge) and that of the rofe tree, perhaps, only depofit their eggs in thefe places, becaufe they find other infefts on which they feed.

The genus might properly be termed cannibals.

In 1795 thefe infefts happened to abound; they entered rooms (allured by the light) in the evening, and frequently exercifed their ftings with great feverity, darting with fuch celerity as fcarcely to be perceived by the eye, and inflicting a wound infтанtaneously.

GENUS 5—SPHEX, SAVAGE.

Many fpecies are common in England; they are chiefly found in woods and hedges. Their larvæ feed upon dead infefts, in the bodies of which they are produced from the egg. Some

Some species dig holes in the earth with their forefeet, like dogs, in which holes they bury dead insects, chiefly spiders or lepidopterous larvæ, and after having deposited their eggs in the bodies of these insects, they carefully close the hole with earth. *See the account from Ray.*

No creature can display more violent affection for its young than this, nor is any more savage.

They all agree in being the fiercest of flies, for they will attack insects much larger than themselves; their strength indeed is great, their jaws are hard and sharp, and their stings are armed with a poison, which suddenly proves fatal to the creatures with which they engage.

The savage seizes boldly on the creature it attacks, giving a stroke with amazing force, then falling off to rest from the fatigue of the exertion, and to enjoy the victory; it keeps, however, a steady eye on the object it has struck till it dies, and then drags it to its nest for the use of its young.

The number of insects which this creature destroys is almost beyond conception, fifty scarcely serve for a meal; the mangled remains about the mouth of its retreat, sufficiently betray the sanguinary inhabitant—the eyes, the filament that serves as a brain, and a small part of the contents of the body, are all the savage eats.

Sphex

Sphex Spirifex : or, *Turner Savage*.

This creature is terrible to smaller insects : it lives in caverns of the earth, on the sides of hills and cliffs, and in holes made in the mud walls of little villages.

In Peterborough, in Northamptonshire, one was taken which had formed its cell in the mud wall of a cottage, which was wrought into the appearance of honey-comb, by the multitude of these creatures.

The eggs are laid in the back part of the cell, where the animal lives, evenly arranged, and when the time of their being hatched is near, the fly brings in a number of slaughtered insects for food to the expected young, she then closes up the mouth of the hole with mud, and her care is over. When the worms hatch, they find their food ready, and when they have eaten their fill, they rest and take their change.

Sphex Hirta.

“ I observed it dragging a green caterpillar thrice its own size; when it had brought it a good way, it laid it down near the mouth of a little burrow it had made in the ground, then removing a little ball of earth, with which it had covered the orifice, it first went down, and after staying a short time returned, and seizing the caterpillar again, drew it down with him; then leaving it there, came up and

and taking some small globules of earth, rolled them one by one into the burrow ; scraping the dust in by intervals with its forefeet, in the manner of a dog ; thus alternately rolling in pieces of earth, and scraping in dust till the hole was full ; sometimes going down (as it seemed to me) to press down the earth ; and once or twice flying to a fir-tree which grew near, perhaps to get turpentine to glew it down, and make it firm : the hole being filled and equalled with the superficies of the earth, that its entrance might not be discovered, it took two fir-leaves, which were near, and laid them by the mouth ; most probably to mark the place."

The sphex is called by some the *ichneumon wasp*.

Sphex Cribaria.

This insect has its fore-feet provided as it were with shields ; it gathers the empty vesicles of the farina which has discharged its pollex, from the stigmata of plants ; thus living upon bran.

GENUS 6.—CHRYISIS GOLDEN FLY.

This insect lives chiefly in the holes of old walls ; where it likewise lays its eggs : the larvæ resemble those of the wasp.

Chrysis Ignitis.

This dwells in holes of walls, between the stones, and in the mortar that cements them.

It

It is often seen issuing from such holes, where it nestles and performs its work : it is called *flaming chrysis*, from its splendor.

GENUS 7.—VESPA, WASP.

Many kinds of wasps live in societies, after the manner of bees, and like them make combs, in which they deposit their eggs; they likewise feed their larvæ with honey, but of a very inferior quality to that of the bee; others of them construct a different separate nest for each egg.

The larvæ and chrysalids of all of them resemble those of the bee.

Vespa Crabro, the Hornet.

This large species of wasp makes its nest in the trunks of hollow trees, and in the timber-work of lofts; its cakes or combs are composed of a substance like coarse paper, or rusty parchment. It is very voracious, devouring other insects, and even bees.

A distinguishing character of this genus of flies, is their bodies being smooth and apparently without hairs; their upper wings, when at rest, are folded in two, the whole length of them. At the rise of each of those wings is situated a scaly part, which performs the office of a spring, to hinder the upper wing from rising too high in the flapping of their wings; a caution very important to those carnivorous

rous insects, who pursue their prey on full stretch of wing.

Vespa Vulgaris, Common Wasp.

The common, domestic, or subterraneous wasps, raise buildings, live in associations, feed on plunder, and commit great outrages on our wall-fruit.

This numerous commonwealth is founded by a single female, which has weathered out the severity of the winter. She digs a hole in a dry soil, or takes up with the dwelling-place of a mole, where she hastily builds a few cells, and deposits her eggs. In twenty days she has a progeny of *neuter* (or working) wasps, ready to labour; these go to work, enlarge the hole, go about upon wood, lattice-work, and window-sashes, in search of materials for building; with their teeth they cut, hack, and tear off small fibres of wood, which they moisten with a liquor which they disgorge, and then convey them to the workshop.

Other labourers are in waiting for them, who, with those materials, set about the construction of the wasp-nest: an edifice outwardly composed of sheets of paper, which not being in contact with each other, dampness cannot penetrate to the inside, which consists of twelve or fifteen stories, and between each runs a colonade, formed by the fastenings, which connect the cakes one to the other.

Every

Every story is, as it were, a market-place, where the citizens may take their walks. The cells are hexagonal.

It is the cradle in which the mother goes on to lay eggs of neuter wasps, to the number of fifteen or sixteen thousand; after which, she deposits three hundred of females, and as many of males.

The first-hatched take great care of those after-born, feeding them first with the juice of fruits and meats, afterwards with the carcases of insects.

The caterers provide for the labourers. Each takes his own portion; there is no dispute, nor fighting.

The wasps now live in peace among themselves, like the bees, but they make war upon us, robbing us of our fruits, cutting the throats of our bees, to possess themselves of their honey, plundering their hives, and living in plenty.

Towards October, when provisions grow scarce, the wasps seem to be seized with rage, and the nest is a scene of horror. They tear from their cradles eggs, larvæ, chrysalids, and the new-born insects, without shewing mercy to any.

They next fight against one another.

Thus the greater part perish: some few females escape, which out-live the winter, and, in the ensuing spring, become the founders of new republics.

Some butchers hang up before their shop a calf's liver, or any tender meat; the wasps come in quest of this delicate food, and pursue the blue-bottle flies, from whose eggs are produced the maggots that spoil meat; the only advantage we can derive from wasps.

Vespa in ramis arborum nidificans, Aerial Wasps.

These are the smallest species.

Their nest is fastened to the branch of a tree with a kind of band, and is in bigness from the size of an orange down to that of an egg. Wood, reduced to paper, is the material part of it, which, if it were of a ruddy colour, might be taken for a large opening rose. It is covered over with a varnish, impenetrable by water. One of those nests was neither moistened nor impaired by that element.

GENUS 8.—APIS, BEE.

There are various species, which build in different manners. Some live in society; others dwell and work in solitude, building the cradles of their family; as the *leaf-cutting* bee does with the rose-leaf; the *upholsterer* with the gaudy tapestry of the corn-rose; the *mason-bee* with a plaster; the *wood-piercer* with saw-dust.

The under-sides of their hindmost thighs, which resemble a kind of brush, serve to gather the fine powder

powder scattered from the antheræ of flowers, and from this the wax or comb is made.

Apis Muscorum. Humming Bee.

These nearly all perish in the winter; a few females survive.

Each female hastily puts together a little nest of moss, in the midst of a meadow. The vaulted roof proves a security against rain, and the flooring, which is also of moss, preserves from dampness. The bee collects unwrought wax and honey, of which she composes a small lump, and therein deposits a few eggs.

The bees produced assist in enlarging the nest; which is exceedingly curious.

The humming bees, though armed with a dangerous sting, are not hasty to use it, so that it is possible to enjoy the pleasure of seeing them at work in building; but as it must be at the expence of much trouble and vexation to the poor insects, (who have already constructed their habitation) it is better to read the description given by a person, who removed a nest for the purpose of observing the process.

“ The bees will be seen to form themselves into a chain, from their nest to the place where the moss has been laid. The foremost lays hold of some with her teeth, clears it bit by bit with her feet,

(which has gained them the name of *carding* bees) then, by the help of her feet, she drives the unravelled moss under her belly; the second, in like manner, passes it on to the third. Thus there is formed an uninterrupted chain of moss, which is wrought and interwoven with the greatest dexterity by those that abide by the nest; and that their nest may not be the sport of the winds, and may shelter them from rain, they throw an arch over it, which they compose with a kind of wax, tenacious, though thin in substance, which is neither the unwrought bees'-wax, nor the real wax. Dissolved in oil of turpentine, it may be used in taking off impressions."

Wax-moths, the larva of a fly of the hornet kind, field-mice, pole-cats, and ants, plunder the little vessels of honey, the store of these industrious bees.

Apis Mellifica, Honey Bee.

One female is at once the mother and the sovereign of the hive.

The neuter bees amount to the number of 16000 or 18000. They form the cakes of wax, collect the bee-glue, honey, and unwrought wax: these bees are armed with a sting. The males, called *drones*, are killed in September by the working bees. These collect from flowers their honey and unwrought wax, they roll themselves over the stamina, the dust of which adheres to their hairs, and bringing over their bodies their feet, armed with little brushes, fill with
the

the powder two small baskets appended to their hind legs ; each of these baskets may contain about the size of a small vetch ; and this is the wax in its undigested state.

As soon as any bee, thus laden, appears near the hive, others go out to meet it, and swallow down the un-wrought wax ; their stomachs being the laboratory where it is converted into genuine wax. This operation being done, each individual disgorges it in the form of dough, and then moulds it into cakes of an admirable structure.

From the nectareous effluvia of flowers, the bees collect the honey by means of their proboscis ; an astonishing piece of mechanism, consisting of more than twenty parts.

Entering the hive, the insect disgorges the honey into the cells, that it may serve for winter subsistence ; or else they stretch out their proboscis, and present it to the labouring bees.

Heat is the life of these insects ; the least degree of cold benumbs them ; and unless they are all crowded together they perish. Their enemies are the wasp, and the hornet, who with their teeth rip them open to suck out the honey contained in their bladder. Sparrows have been seen with one in their bill and another in each claw. The wax-moth, a species of grub, fixes itself, in their hives, and eats up their honey.

The

The queen bee has a sting; but is not forward to use it. The bees treat their queen with great respect and affection: if she happen to die, all their labours are at an end; and it is said they would be starved; but if a new queen be given them, joy springs up; the hopes of seeing one will support them: this has been tried by giving the chrysalis of a queen to a swarm that had lost its own.

The queen lays fifteen or eighteen thousand eggs, from which are to be hatched seven or eight hundred drones, four or five queens, and the remainder are neuter or working bees.

The bees make different cells for these various kinds of young; the parent knows what she is to lay, and deposits each in its proper cell. The neuters are the nurses, they feed the grubs with a composition of unwrought wax and honey, and bring them up with tenderness. The bees will follow their queen any where, which affords a method of removing bees to new hives. Only one queen is suffered to live; and it is said that the bees have the power of nursing up a successor, on occasion.

Mr. Williams' method of removing Bees.

- Set the hive where there is only a glimmering light—turn it up—the queen first makes her appearance—once in possession of her, you are master of all the rest; put her into an empty hive, whither she will be followed by the other bees.

The

The old queen goes off with the first swarm, which makes it so valuable.

Carpenter-Bees.

These make a hole in rotten wood, into which they enter backwards, deposit their eggs together with some honey, close up the lodge, and there the larva undergoes its change.

Apis Centuncularis,

Leaf-cutting bee; of this there are several species, all equally industrious; they dig into the ground, build nests that have the form and size of thimbles, inserted one within another; others are no bigger than goose quills.

These nests are composed of pieces of leaves; each species of bee cuts into its own materials; some the rose-leaf, others the horse-chestnut. A careful observer may discover rose-tree leaves cut, as if with a pinking iron; a circular piece is cut out, fit to be either the bottom or the lid of one of these nests: others it cuts out into ovals and semi-ovals, which form the sides of the nests; into each of which it deposits an egg with ready prepared victuals. The Bee cuts the leaf as it were at a stroke.

I have seen the Malabar nut so cut.

Each single nest looks like a bale of cloth in miniature.

GENUS

GENUS 9.—FORMICA, THE ANT.

The males and females are winged; the neuters apterous; the females and neuters are armed with a sting. The males are smaller than the females and neuters, and are distinguishable by the largeness of their eyes.

Ants are distinguished by a little upright scale between the thorax and abdomen.

The working ants labour incessantly to supply the larvæ with provisions, and are constantly employed in preserving the chrysalids from humidity in wet seasons, or exposing them to the warmth of the sun when it is fair. These chrysalids are much larger than the perfect insect, yet are carried about by them with ease.

With good reason, a nest of ants is called a well regulated republic. Their peace, union, good understanding and mutual assistance deserve the notice of an observer. The form of a nest is that of an arched vault, leading into a cave contrived by their removing the mould with their jaws.

Great police in their little labours prevents disorder and confusion; each has its task; while one casts out the particle of mould that it has loosened, another is returning home to work. All of them employed in forming themselves a retreat of the depth
of

of one foot or more ; within this hollow den, supported by the roots of trees and plants ; the ants come together, live in society, shelter themselves from summer storms ; from winter frosts ; and take care of the eggs.

The *wood ants* are larger than the garden ones ; armed with a small sting, they wound whatever offends them.

They are carnivorous ; they dissect frogs, lizards and birds.

It is curious to see with what care they carry the new-hatched larvæ in their jaws, to expose them to the early rays of the sun : it is chiefly for them that the rest go to and fro, bring home, and lay up ; they shortly turn to chrysalids ; in which state they want no food ; but new cares arise to suit their situation to their state. The insect in due time tears its white transparent veil ; it is then a real ant.

Ants pass the winter in a torpid state till spring restores them, they have therefore no need of food for winter in this country.

Ants are very fond of the honey-like liquor emitted by plant-lice, and they both eat and carry home the leaf-lice themselves, so that it appears they must do service in gardens, by helping to destroy those hurtful insects, though it must be owned they claim a share of the fruit.

In

In Switzerland, ants are made useful by hanging a pouch full upon a tree (the foot so smeered with clay or soft pitch that they cannot escape) thus compelling them to devour the caterpillars.

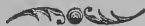
What are sold for ants eggs are grubs newly hatched, of which pheasants, partridges, and nightingales are fond.

GENUS 10.—MUTILA.

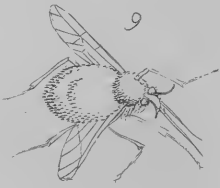
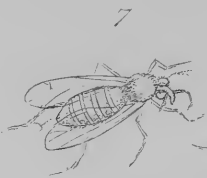
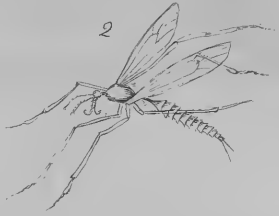
Mutilla Europæa.

These beautiful insects are inhabitants of the ground, and to be met with under the moss, more especially when there is a hollow space between the moss and the earth.

They are described as making a most beautiful appearance on turning up the earth. They are swift in motion ; their wings shine like pearl ; some are without wings ; and they appear to live in society like the ants.



ORDER, VI.



VI.

Order—DIPTERA.

Two Wings, and two Pairs.

GENUS 1.—ÆSTRUS GAD-FLY.

THE Æstrus has no mouth, in the place of which three small impressed points are found without any visible proboscis or rostrum.

The larvæ of the æstri lie hid in the bodies of cattle, where they are nourished the whole winter; the perfect insects are to be met with in the summer almost wherever horses, cows, or sheep are grazing; some of them lay their eggs under the skin of cows or oxen, which they pierce for that purpose; others, for the same end, enter the intestines of horses; and others, again, deposit them in the nostrils of the sheep; in these different habitations the larvæ reside till full grown, when they let themselves fall to the earth; and generally pass the chrysalid state under cover of the first stone they meet with.

G

From

From the hinder part of the body of the perfect insect issues a whimble of wonderful structure, it is a scaly cylinder composed of four tubes, which draw out like the pieces of a spying glass; the last is armed with three hooks; and is the gimblet with which the insect bores through the tough hides of horned cattle. The animal seems to experience no pain, unless the insect, plunging too deep, attacks some nervous fibre; in which case the beast runs about, and becomes furious. The egg being hatched, the grub feeds on the matter of the wound. The place of its abode forms upon the body of the quadrupeds a bunch sometimes above an inch high. When full-grown the larva breaks through the tumour, and slides down to the ground in the cool of the morning. It then digs itself a burrow, into which it retires. Its skin grows hard, and turns to a very solid shell. There it is transformed to a chrysalis, and afterwards to a winged insect.

Nature has provided for every exigence; the shell, wherein the œstrus is enclosed, is of so strong a texture, that it could not make its way out if there were not at one end a small valve, fastened only by a very flight filament; the first push the œstrus makes the door opens.

Tar and milk, or tar, butter and salt, are said to guard sheep and cattle from this inconvenience.

The

The æstrus which chooses the intestines of horses for the cradle of its young, Barbut calls a forest insect; he adds, there is some reason to think this æstrus is viviparous, and that the pain the quadruped feels is occasioned by the action of the larva that grapples for its hold; for the grub is all over hooks and spines, which serve as so many anchors to prevent it being cast out with the excrement.

When full grown, it lets itself down to the ground, turns to a chrysalis, &c.

In 1713, many horses in Verona and Mantua perished by the quantities of those larvæ deposited within their entrails.

Oestrus Ovis.

The æstrus of sheep is of a lazy sluggish disposition. The female makes her way into the sheep's nostrils, deposits its eggs within the frontal sinus, and retires. The eggs turn to grubs, which feed on the mucous matter which they there meet with: whenever those grubs, armed with hooks, stir, or change their situation, the sheep is in pain. That creature, so gentle, so peaceable, falls then into a kind of phrenzy, expressing the keenness of its anguish by its leaping and bounding, and beating its head against the trees and ground. After a while, the full-fed larvæ drop from those creatures noses, together with the mucus which they eject, conceal themselves in the ground, and there undergo their change.

One species lays its eggs in the throat of the stag. The insect creeps into the nose where it finds two issues; one of which leads to the frontal sinus; the other to two bags situate at the root of the tongue; into which latter it unerringly enters, leaves a number of eggs, and departs. The grub finds lodging and food; comes after a while out of the stag's nose, &c. &c.

GENUS 2.—TIPULA, CRANE-FLY:

This is often taken for the gnat, which it resembles.

The larger tipulæ go by the name of sempstresses; the small ones by that of culiciform; which latter, in fine summer evenings flutter about the water side in legions.

The shrill noise they make with their wings is not very discernible.

Tipulæ, before they become inhabitants of the air, creep under the form of grubs. Those which turn to larger tipulæ, dwell in holes of decayed willows, in the dampest places, where they change into chrysalids, and in that state have the faculty of breathing through two small curve horns; besides which, they are endued with progressive motion, but not retrogressive, being impeded by little spines placed on every ring of the abdomen. When the shroud is torn, the insect, prettily apparelled, escapes from his gloomy

gloomy habitation by means of his wings, which often are variegated; and takes his pastime in the fields. Its long legs and its wings mutually assist each other when it either walks or flies.

The larvæ and chrysalids of the little tipulæ are found in water; they are various in colour, form, and carriage; some, like the polypus, furnished with a pair of arms; several with cylindrical tubes that perform the office of vent-holes. These swim with nimbleness; those never leave the holes they have dug themselves in the banks of rivulets. Lastly, others make a silken cocoon that receives part of their body: all receive wings.

Their frame is then so weak, that a touch is enough to crush them.

In the state of larva they were a prey to fishes—in their progress through the air they are equally a prey to birds.

One species has its forelegs extraordinarily long, but they do not touch the ground, but are moveable like antennæ.

Tipula Crocata.

The larva is long, yellowish, with 14 rings and has 6 little feet. It is found in the stumps of decayed trees, amongst the kind of tan formed in those stumps. The chrysalis is the colour of bark, and of a peculiar shape.

Each

Each of its wings is as it were crowned with small spines towards the tail ; and the head is adorned with two thin taper horns, rather long and curve.

The perfect insect is often met with in meadows. The larvæ generally live under and consume the roots of vegetables, which larvæ prove dainty food to the crows, in whom, nature has seemingly ordained this instinct, to the end the larvæ might not exist in too great numbers ; so as to destroy the produce of the earth.

GENUS 3.—MUSCA, FLY.

The mouth of the musca is formed by a soft, fleshy proboscis, with two lateral lips ; it wants palpi.

The musca is the most common of all insects, the name of *Fly* is particularly applied to them.

Of some, the larvæ live in the water, and devour aquatic insects.

Of some, the larvæ devour the aphides : These larvæ seem to want eyes ; and lengthen or stretch out their head as if to feel for their prey. Others live in and consume all kind of putrid flesh ; others are found in cheese ; others in the excrement of different animals ; many live in the water, and prefer the most putrid and muddy. One is found on the rose.

Musca Chamæleon.

Its head greatly resembles that of the æstrus ; and
the

the eyes occupy the greatest part of it : the larva of this fly dwells in fresh water : the perfect insect is wont to walk upon the surface.

It is one of the most common two-winged insects we have. The female deposits her eggs in the hollow stalk of aquatic plants, or broken reeds; or so provides for them that they cannot, but by some unforeseen accident, be carried away. The egg in due time ripening, produces a larva no way resembling the parent, but rather a worm of a singular structure. They may be seen crawling on the grass and plants near shallow standing waters; or floating on the surface.

The tail has a verge of hairs, which, when expanded, support it on the surface, with its head downward; if it wish to descend, it contracts the hairs in the form of a wine glass, or entirely closes them at the end; and when again it is rising to the surface, it forces a bubble from a small aperture in the centre, which immediately makes a passage for its ascension. It changes to the pupa state, and about the middle of July to the fly. It subsists at that time on the nectar, and other juices, which it extracts from the bottom of the corolla in flowers.

Musca Pendula.

The habits nearly correspond with those of the last described. It is found in June.

The

The vapour of sulphur and arsenic destroys flies; or they may be taken in phials of honeyed water.

It is said, that agaricus muscarius and milk will invite them, and that the moment they taste it they die.

GENUS 4.—TABANUS.

The tabani nourish themselves with the blood of horses and cattle. As they are most frequent near watery places, it is probable that their larvæ are aquatic; though some assert that they live under the earth.

Tabanus Bovinus.

The great horse-fly—length, an inch.

This insect is the terror of horned cattle, of horses, &c. Its mouth, armed with two sharp hooks, penetrates through their hide. Its proboscis, shaped like a sting, sucks out their blood, of which it is greedy.

These flies are seen in summer to harass the cattle, which are sometimes so molested by their stings, that they go mad, agitate themselves, run down precipices, tear themselves against the stumps of trees.

The puncture of the tabanus is keen and painful. It is very common in damp woods and meadows, especially during the great heats, when it is most troublesome.

Tabanus

Tabanus Pluvialis.

The most common species; length, 4 lines, of an ashen grey, has very fine eyes.

All the genus accord in their way of life, but differ in size and colour.

They have been named *burrel* or *whame-flies*, by some English authors.

GENUS 5.—CULEX, GNAT.

The larvæ of the culices are very frequent in standing waters; their bodies are composed of nine segments, which diminish in size and length from the head towards the extremity of the body; the last of these sections is furnished with a kind of stigmata, through which the larva breathes, frequently rising for that purpose to the top of the water.

The head of the chrysalis is so much bent under the breast, that the thorax appears to be the most advanced part of the body; the stigmata are placed upon the back of the thorax, the segments of the abdomen diminish in size towards the extremity, the last terminates in a kind of flat tail or fin, by mean of which the insect swims or moves itself in the water.

The culices generally frequent woods and watery places; they are known by the name of *midges*.

It

It is asserted, that where large quantities of them are found, the soil is generally marshy, and the air unwholesome.

(From Barbut) *Culex Pipiens*.

These insects, too well known by the several punctures they inflict, and the itchings thence arising, afford a most interesting history. Before they turn to flying insects, they have been in some manner fishes, under two different forms. From the beginning of May till winter, small grubs may be seen with their heads downward, their hinder parts on the surface of the water, from which part arises sideways a kind of vent-hole, or small hollow tube, like a funnel, and this is the organ of respiration. The head is armed with hooks, that serve to seize on insects and bits of grass, on which it feeds: on the sides are placed four small fins, by the help of which the insect swims about, and dives to the bottom. These larvæ retain their form during a fortnight or three weeks, after which period they turn to chrysalids. All the parts of the winged insect are distinguishable through the outward robe that shrouds them. The chrysalids are rolled up into spirals. The situation and shape of the wind-pipe is then altered; it consists of two tubes, near the head, which occupy the place of the stigmata, through which the insect is one day to breathe. It is a pleasing sight to observe in a tub or glass of water the motions of these insects.

The

The chrysalids, constantly on the surface of the water, in order to draw breath, abstain now from eating, but, upon the least motion, are seen to unroll themselves, and plunge to the bottom, by means of little paddles situate at their hinder part. After three or four days strict fasting, they pass to the state of gnats. A moment before, water was the element of the little creature; but now become a winged insect, he can no longer subsist in it. He swells his head, and bursts his inclosure; the robe he lately wore turns to a ship, of which the insect is the mast and the sail. If, at the instant the gnat displays his wings, there arise a breeze, it proves to him a dreadful hurricane, the water gets into the ship, and the insect, who is not yet loosened from it, sinks and is lost. But in calm weather the gnat forsakes his slough, dries himself, flies into the air, seeks to pump the alimentary juice of leaves, or the blood of man and beasts. It is impossible to behold and not admire the amazing structure of its sting; what the naked eye discovers is but a tube, containing five or six spicula of exquisite minuteness, some dentated at their extremity, like the head of an arrow, others sharp edged, like razors. These spicula, introduced into the veins, act as pump-suckers, into which the blood ascends, by reason of the smallness of the capillary tubes. The insect injects a small quantity of liquor into the wound, by which the blood becomes more fluid, and is seen through the microscope passing through those spicula.

The

The animal swells, grows red, and does not quit its hold till it has gorged itself. The liquor it has injected causes, by its fermenting, that disagreeable itching, which may be removed by volatile alkali, or immediately rubbing and washing with cold water.

At night, to rub with fuller's earth and water, lessens the inflammation.

The female deposits her eggs on the water, placing them in the form of a little boat, composed of two or three hundred eggs, it swims on the water two or three days, after which they hatch. If storms arise, they sink. There are fresh ones every month. Were they not devoured by fish, water-fowl, and swallows, the air would be darkened.

GENUS 6.—EMPIS.

The perfect insect is common upon flowers.

The larvæ and chrysalis are unknown.

GENUS 7.—CONOPS.

The conops is chiefly found in meadows and fields, where the different species are very troublesome to cattle: they draw blood from horses. The larvæ and chrysalids are unknown.

One of these insects (*conops calcitrans*) is found every where, in autumn especially; it differs from
the

the common fly in having a hard sharp trunk, "with which it pricks our legs in autumn."

Another species resembles a wasp: it is half an inch in length, beautiful, and found in meadows.

GENUS 8.—ASILUS.

This is called by some authors the *wasp* fly, and not improperly, as, like the wasp, it stings severely whatever offends it, though with a different instrument, namely, its proboscis (for which reason it ought not to be taken without precaution). They sting with this instrument different animals, and draw out their blood, which they suck through their trunk. They are very troublesome to cattle in low meadows, where they are frequently met with.—The larvæ and chrysalids are not known. This insect was caught in Hyde-park. *Asilus Crabroniformis*; or Hornet-fly.

GENUS 9.—BOMBYLIUS, BUZZ-FLY

Several species of the bombylii are very common in the spring, about the months of March and April; they are generally found upon flowers in woods and marshy grounds.

Their larvæ are probably aquatic; the perfect insect being most common in gardens or marshy grounds; it hovers about flowers and sips the nectareous dew with its proboscis without settling.

It may be safely handled.—*The plate is B. medius*—said to hover in the air like a hawk; and dart with great celerity. *B. major* is called *Humble Bee-Fly*.

GENUS 10.—HIPPOBOSCA, HORSE-LEECH.

The Hippoboscæ have been called by some authors *spider-flies*, from the resemblance which some of them bear to that insect, others have called them *horse-flies*; by which name they are more generally known.

They are found frequently in woods and marshy places; but most commonly on the bodies of birds; those of horses and other quadrupeds; sucking their blood, upon which alone they subsist.

Their larvæ are unknown. One species is known to be pupiparous; the egg being larger than the mother; and is rather a pupa or chrysalis, than a real egg, since the compleat or winged insect is produced from it.

Hippobosca Equina.

Received from the New Forest, in Hampshire, where numbers of them live, and riot upon horses and cattle. They are very hard to kill, being covered with a hard crustaceous shell; and they fix so close and fast to the poor animals, with their claws, that
they

they cannot rub or bite them off without wounding themselves.

The feet are armed with many talons in this genus.

There is a small species in swallows nests.



VII.

Order—A P T E R A.

Without Wings.



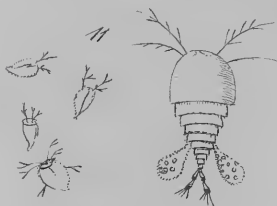
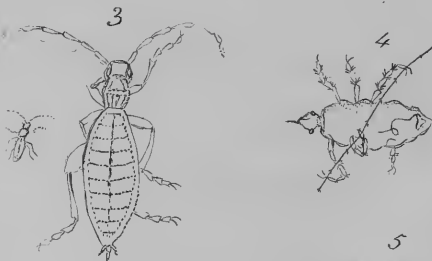
GENUS 1.—LEPISMA.

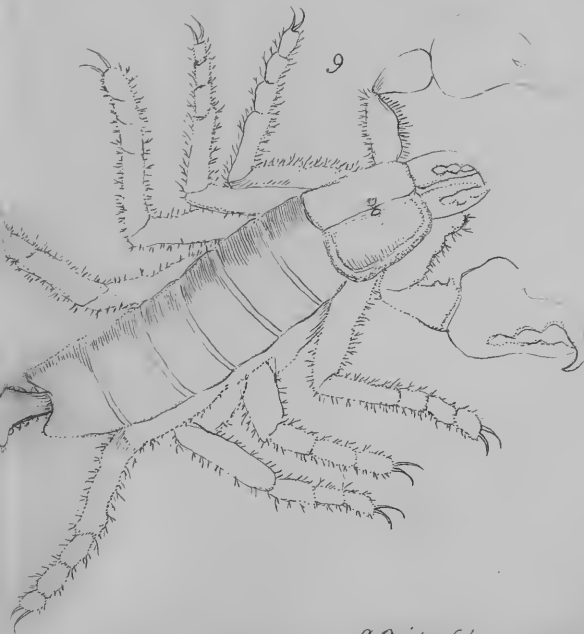
THE insects belonging to this genus are very frequent under old floors, wainscots, &c. especially in damp houses. They run with great swiftness, and are generally of bright shining colors; they are supposed to live upon wood-lice; or by sucking the humidity of the wood, under which they live.

Lepisma Saccharina.

Silvery lead colour like a fish; in the joints of sash-windows that are wet and seldom opened; and among old papers.

GENUS





GENUS 2.—PODURA SPRING-TAIL.

The Poduræ are generally found upon the ground in sand or gravel-pits; or under branches of trees, stones, &c. in humid places. One species is found upon the water, upon the surface of which it leaps with great agility. It is not known upon what any of them feed. The insect leaps by means of its tail.

Podura Villosa.

The largest we have—the length 2 lines, commonly found under stones.

The poduræ are distinguished into several species. Those which inhabit still waters assemble in troops in the morning on the banks of pools, fish-ponds, and reservoirs. Others are found in damp places, under leaves, bark, and stones, heaps of rotten wood, mush-rooms and in melon-beds. It eludes the grasp by its elasticity: its hard, forky tail is a kind of spring by means of which the insect is thrown into the air.

GENUS 3.—TERMES.

They are generally called *wood-lice*.

The insect is found in old wood, decayed tables, and books not often opened.

Termes

Termes Pulsatorium.

Less than a common louse.

It runs, and even leaps a little when touched.

This insect has been thought by some to imitate the ticking of a watch, by striking its head against the wainscot; which occasioned Linnæus to give it this name. But this noise is caused by one of the ptini; and is a call to others of the species; mistakenly, by some superstitious persons, called the death-watch.

GENUS 4.—PEDICULUS, LOUSE.

There are various species,

Few of the pediculi of birds have been observed; though it is pretty certain that almost every different animal is infested with a different species of them.

The plate is *Pediculus humanus* Common, Louse.

GENUS 5.—PULEX, FLEA.

The Flea is the only insect belonging to this order that undergoes the same metamorphosis with those of the other orders. All the other apterous insects being produced in their perfect state, either by the mother or from the egg.

The larva has a forked tail; and spins a covering for the pupa; which has feet; of which, however,
it

it can make no use, they being immoveable. The larva may be nourished in boxes, and fed with flies, of which they are fond. They are small, lively, and creep like caterpillars, they pass 14 or 15 days in the larva state, and feed on greasy down.

Remedies against Fleas.

Brimstone, fumigation of penny royal, or the fresh leaves sewed in a bag and laid in the bed.

GENUS 6.—ACARUS, TICK.

The acari live chiefly upon other animals; quadrupeds, birds, and insects: some of the latter are often quite covered with them, others of them live in the water, others upon trees, plants, &c.

They are oviparous:

The disease called the itch is supposed to be owing to small ticks or mites as some call them.

Acarus coleoptratum, Beetle-Tick.

This is one of those animals whose minuteness secures it from danger, whilst it draws nutriment from the blood, and frequently from the vitals of larger insects. Every animal is tormented by these beings, distinguished by the name of lice, bugs, fleas, mites, &c.

Beetles are in general infested with, and severely injured by these creatures.

The

The *Scarabæus Stercorarius* (the common dor, or clock) is sometimes found almost devoured by them; little except the shell remaining; and in this state they will live some days.

The Beetle-Tick is given magnified as it appeared upon the leg of a beetle placed in a microscope. Two or three hundred have been found on a beetle.

The Sheep-Tick is found alive in wool a long time after it is cut off.

Acarus Telarius.

According to Geoffroy, this insect spins a web on the bark of trees, generally on the north side, from top to bottom of the trunk; which web being dispersed by the wind, covers the fields with those innumerable threads, which some naturalists have mistaken for condensed vapour.

They are called *virgin's threads*: some think that these threads, floating in the air, waft the insect about; and serve as a net to entrap other insects on the wing.

GENUS 7.—PHALANGIUM.

Only one species is common in Europe. The feet of this insect are very slender, weak, and liable to be broken—some think that they grow again (one having been found with seven legs of the usual length, and one shorter.)

They

They are in general nocturnal insects ; flying the light ; and searching for their prey in the night time. Many of them devour the acari, wood-lice, spiders, &c. Some of them live in the sea, attached to the bodies of the large aquatic animals ; others in the trunks of decayed trees.

It is called *Shepherd Spider* and *Harvest-man*.

GENUS 8.—ARANEA SPIDER.

The eyes of spiders are immoveable, and their structure is different from that of the eyes of most other insects, consisting each of only one lense, which deprives them of the faculty of multiplying objects ; as that of their immobility does of seeing such objects as are placed otherwise than exactly before each eye.

See Eyes of Insects.

Spiders prey upon all weaker insects ; even those of their own species ; and are themselves destroyed by sphages and ichneumons.

They change their skin.

The thread so fine consists of 6000 threads ; which issue from six passages. Gloves and stockings have been manufactured from the ball of silk which the garden-spider carries about her ; (containing her eggs) which is their strongest thread ; being five times finer than what the silk-worm spins. They were of a beautiful

tiful natural grey colour; and almost as handsome and strong as those made with common filk.

But to obtain one pound of the spiders filk would have required twenty-eight thousand cods; and as none but the females spin those cods, a much greater number of spiders must have been bred. The main difficulty arises from the carnivorous disposition of spiders, who devour each other.

A proper food had been found for them in the soft substance of fresh quills. Some foreign spiders spin stronger filk than ours, and in larger quantities. Had the filk of spiders answered, we should have had several genuine colours in filk; such as grey, white, sky-blue, coffee-colour; whereas filk-worms only yield white and orange colour.

The wandering Spider.

This does not lie in wait for its prey, like the rest; it is a lively, active, hunter; its head is furnished with immoveable eyes; without any motion of the head the insect perceives all the flies that hover round about, does not scare them, but stretches over them its arms furnished with feathers, which prove nets, in which their wings entangle. The spider seizes them with its merciless claws, and sucks their blood.

Birds are very fond of the egg-bag of spiders, and of the young spiders often found in it; they frequently

frequently rob the female of this and fly away to the next eminence, to regale themselves with the delicious morsel.

Some perhaps escape ; which accounts for finding spiders on the top of steeples and other high buildings.

The Solitary Spider.

This species spins loose irregular webs, in uninhabited parts of houses.

The *cellar spider* is armed with strong pincers; they sometimes gripe, but the wound is not dangerous in this country. They dig a hole in the sand, line it with silk to keep it from falling in ; lie in ambush, and seize the moment when they spy prey even at the distance of two feet, and dart upon it with rapidity.

Aranea Aquatica.

Lives and hunts at the bottom of the water, devouring its food within a globule of air formed by itself. St. Pierre, in *Studies of Nature*, describes poetically, its residence and the society it enjoys.

GENUS 9.—SCORPIO, SCORPION.

This insect has a sharp crooked sting in its tail. The venom of the scorpion is accounted more dangerous than that of any other insect ; it has been frequently

quently attended with the loss of life in hot countries.

In Batavia they are said to grow to the length of twelve inches; and along the gold coast to a greater size.

Heat probably gives activity to the poison, and a great degree of rage in the creature, which inflicts the wound may encrease the danger: an instance of speedy death even in our temperate climate occurred, a few years since; a dog dying in half an hour after being bitten by a viper. But happily such events are very rare in our favoured country; which has no claim to rank the scorpion amongst the insects of the island; except from an assertion, that a diminutive insect of that genus (no bigger than a flea) was once seen amongst some seeds.

Scorpions bring forth their young alive.

Their food is chiefly worms and insects.

GENUS 10.—CANCER, CRAB.

Crabs are long lived, and change their crustaceous skin every year. They feed equally upon plants, dead and live animals; and frequently the strong and healthy ones devour such as have just changed their skin, at which time they are weak and languishing; and their new skin is soft; at this time they fall a prey to many other animals, and chiefly to different

rent species of the marine polypus. Some authors assert that the crab changes its stomach and intestines at the same time with its skin; and that the first food it takes is that stomach when it recovers so as to begin again to eat. *Darwin* says that a hard-shelled crab always stands sentinel to prevent the sea insects from injuring the rest in their defenceless state; and that the fishermen from his appearance know where to find the soft ones, which they use for fish-bait: adding—"and though the hard-shelled crab, when he is on this duty, advances boldly to meet the foe, and will with difficulty quit the field; yet at other times he shews great timidity, and has a wonderful speed in making his escape; and if often interrupted, will pretend death and watch an opportunity to sink himself into the sand, keeping only his eyes above."

There are several species.

The *lobster* is well known, and the circumstance of losing its claws at thunder claps, or the sound of cannon; so that fishermen are jestingly threatened with a salute by the sea-men; the restoration of their claws is likewise to be observed, as they never grow quite to the same size.

The Cancer Parasiticus,

Of this there are several species. They are very small, and their shells so tender as to be very liable to injury: instinct directs them to shelter themselves in mussels,

mussels, oysters, &c. Pennant calls one of them the *Pea Crab*, and reprobates the vulgar idea of their being poisonous.

Hermit Crab.

This species of crab has a naked tail; and it takes up its abode in an empty shell, most commonly that of a whelk. It feeds on fish and insects.

It goes by the different names of *Hermit*, *Soldier*, and *Bernardine*. Upon the least noise it retreats to its shell; when caught it emits a faint cry; but pinches forcibly with its claws; nor is there any way of getting disengaged but by heating the shell.

GENUS 11.—MONOCULUS.

The monocoli are both oviparous and viviparous; they live in stagnated waters; some of them feed upon plants, others attach themselves firmly to the bodies of fish, whose blood they suck for their nourishment; they swim, or rather spring upon the water with great agility; they are in general very small, but lay an amazing number of eggs: they lose all motion, and seem to cease to live in summer, when the great droughts have deprived them of water, but revive when restored to their proper element.

Linnæus relates that one species of them (which is red) is sometimes so numerous as to make the water look as if it were tinged with blood.

This

This insect is particularly curious on account of the formation of its arms, and the motion it makes with them in the water. By means of these, the little creature can move in any direction, waving them as a bird does its wings. They sometimes remain several days on the surface of the water, at other times are seen only at the bottom; but whether at the bottom or the surface they are constantly in motion. The motions are very rapid, so that the little animal appears as if jumping in the water; its head always tending to the surface, and its tail stretched downwards. Some call it the *Water-Flea*, but that name is likewise applied to the *gyrinus*, a black insect of the first order.

Monoculus Quadricornis.

Less than half a line in length; its antennæ appear like a branch: the animal carries its eggs on the two sides of its tail; the feet are placed under the body, but it makes little use of them; the antennæ being of more service toward the leaping and skipping, which it performs in the water with great nimbleness.

Found in standing pools: other insects and polypi feed upon them.

Monoculus Conchareus.

The shell monoculus.

This is provided with a bivalvular shell; within which he shuts himself up if drawn out of the water.

The shell opens underneath ; the insect puts forth its antennæ, by means of which it swims very expeditiously in various directions, seeking a solid body to adhere to ; and then it uses its feet in walking, by stretching them out through the aperture of the shell.

Their encrease is prodigious and rapid ; a glass full of water became in a fortnight a mass of animated matter of various colours ; and this from a single pair.

GENUS 12.—ONISCUS.

The onisci change their skins like many other apterous insects ; it is composed of several crustaceous plates.

They are found in houses, gardens, and woods ; some species live in the water ; they are sometimes called *hog-lice*, and one species is made use of in medicine (*oniscus asellus*) ; one is called *armadillo*, because it rolls up.

Oniscus Aquaticus.

This is found in pools, small rivulets, and especially in springs, some in the sea. They swim well ; are viviparous, the land ones oviparous.

GENUS 13.—SCOLOPENDRA.

The body of the Scolopendra is flat ; and composed of a great many rings or segments, which augment as the insect advances in age, till it is fully grown ;

grown ; it changes its skin in the same manner as the two preceding genera.

Some species are frequent in gardens, and all humid places, under stones, &c.

Scolopendra Forficata.

The largest in this country ; it is found under stones, on the ground under flower pots, and garden boxes. Feet 30.

Some call these insects millepedes. Some live in decayed wood ; some in salt water, some in fresh.

The *darting milleped* is a nimble swimmer, retires to aquatic plants, and falls a prey to the polypi ; it will encrease by cutting like the polypus.

The *marine scolopendra*, like a leach extended and depressed, builds itself little cells with great skilfulness. They are seen in some parts lying on the sea-shore at low water. They are masses composed of a multitude of little funnels of a brittle and porous texture. The aperture of the funnel is closed up with a small lid of sand, contrived by the animal to shelter himself within his tube from all danger.

Scolopendra Electrica.

Shines in the dark,---140 feet.

GENUS 14.—IULUS.

The iuli differ from the scolopendræ in the shape
 I 3 of

of their body, and number of their feet; which last are likewise very short.

The skin is exceedingly hard, and is changed like that of the scolopendra, &c.

They are frequent in humid places.

Iulus Terrestris.

This small insect, 5 lines only in length, has on each side one hundred very short feet, close set.

It is met with under stones, and in the earth.

Iulus Sabulosus

Larger; with one hundred and twenty feet on each side.

When touched, rolls into a spiral, so that its feet are outward, but yet turned towards the ground.

It is found with the preceding one; to which it bears a great resemblance, though it is much larger.

ARRANGEMENT

OF

INSECTS.



Orders.



INSECTS are divided into Orders from the circumstance of their having or wanting wings ; and from the number or substance of which those parts are composed.

THERE ARE SEVEN ORDERS :

- I. COLEOPTERA.
- II. HEMIPTERA.
- III. LEPIDOPTERA.
- IV. NEUROPTERA.
- V. HYMENOPTERA.
- VI. DIPTERA.
- VII. APTERA.



I. COLEOPTERA.

Which have four wings ; the upper ones are called *Elytra*, or wing-cases ; they are of a hard horny substance, and meet on the upper part of the body in a direct line. *Beetles, &c.*

II.

II. HEMIPTERA.

Which have four wings ; the upper ones (*elytra*) resemble strong vellum or parchment ; they cover the body horizontally ; the inner margins extend the one over the other, not meeting in a direct line, as in the coleoptera. *Cricket, &c.*

III. LEPIDOPTERA.

Which have four wings ; all membranaceous, and imbricated, or covered with scales, fixed upon them like tiles upon the roof of an house ; these when magnified appear like feathers.

Butter-Fly. Sphingr. Moth.

IV. NEUROPTERA.

Four wings ; membranaceous, but naked ; they appear like net-work.

No sting.

Dragon-Fly, &c.

V. HYMENOPTERA.

Four membranaceous wings, which are naked.

The tails of the females are armed with a sting.

Bee, &c.

VI. DIPTERA.

Which have only two wings ; being furnished with poisers or balancers, (called *halteres*) instead of under wings. *Fly, &c.*

VII. APTERA.

This order of Insects never have wings in either sex, or at any period. *Spiders, &c.*

GENERA.

These seven Orders are again divided into Genera.

I. COLEOPTERA.

This order is known by the crustaceous Elytra which cover and protect the wings, and contains the following genera.

GENUS

GENUS		PAGE.
1	Scarabeus---Beetle	1
2	Lucanus---Stag-Beetle	3
3	Dermeftes	4
4	Ptinus	5
5	Hifter	5
6	Gyrinus	6
7	Byrrhus	6
8	Silpha	6
9	Caffida---Tortoise-Beetle	7
10	Coccinella	7
11	Chryfomela	8
12	Hilpa	8
13	Bruchus	8
14	Curculio	8
15	Attelabus	9
16	Cerambyx---Capricorn	10
17	Leptura	10
18	Necydalis---Carrion-Eater	11
19	Lampyrus---Fire-Fly	11
20	Cantharis	11
21	Elater---Skipper	12
22	Cicindela---Sparkler	12
23	Bupreftris---Cow-Burner	12
24	Dytifcus---Plunger or Diver	13
25	Carabus---Bull-Head	14
26	Tenebrio---Darkling	14
27	Meloe---Blöffom-Eater	15
28	Mordella---Nibbler	15
29	Staphilinus---Rove-Beetle	15
30	Forficula---Ear-Wig	16

II. HEMIPTERA.

The wing-cafes are of a fubftance lefs hard than thofe of the foregoing order ; fome part of their inner margins are croffed or laid over the other above the abdomen.

The

The mouth and proboscis of the insects which compose this order are inflected and bent inwards towards the breast.

This order contains the following genera :

GENUS		PAGE
1	Blatta---Cockroach	17
2	Mantis---Sooth-Sayer	18
3	Gryllus---Cricket	18
4	Fulgora---Lantern-Fly	21
5	Cicada { Frog-Hopper, or { Flea-Locust	21
6	Notonecta---Boat-Fly	22
7	Nepa---Water-Scorpion	22
8	Cimex---Bug	23
9	Aphis---Plant or Leaf Loufe	23
10	Chermes	24
11	Coccus---Cochineal	25
12	Thrips	27

III. LEPIDOPTERA.

Four wings covered with a mealy powder, or a kind of scales lying like tiles ; when these scales are rubbed off the wings are a naked membrane.

This order contains the following genera :

GENUS		PAGE
1	Papilio---Butter-Fly	28
2	Sphinx	28
3	Phalena---Moth	29

IV. NEUROPTERA.

Four membranaceous wings ; naked ; reticulated with veins, or in which the membranes cross one another, so as to appear like net-work.

Their tail is unarmed, or without a sting ; but is frequently furnished with appendices like pincers, by which the males are distinguished.

GENUS		PAGE
1	Libellula---Dragon-Fly	31
2	Ephemera---Day-Fly	32
3	Phryganea	34
4	Hemerobius	35
5	Myrmeleon---Ant-Eater	37
6	Panorpa	38
7	Rhaphidia	39

V. HYMENOPTERA.

The insects belonging to this order have generally four membranaceous naked wings; the neuters however, in some of the genera; and in others the males or females want wings.

The bodies are shorter than those of the fourth order, and the wings are not so much like net-work.

The tail (except in the male) is armed with a sting.

This order contains the following genera:

GENUS		PAGE
1	Cynips---Gall-Fly	40
2	Tenthredo---Saw-Fly	42
3	Sirex---Tailed Wasp	43
4	Ichneumon	43
5	Sphex---Savage	45
6	Chrysis---Golden-Fly	48
7	Vespa---Wasp	49
8	Apis---Bee	52
9	Formica---Ant	58
10	Mutilla	60

VI. DIPTERA.

The insects belonging to this order have two wings.

They are furnished with a poiser or balancer (*halteræ*) under each wing; which is terminated by a *capitulum* or knob: the base is concealed under a little scale, by which it is covered as by a shed.

This

This order contains the following genera:

GENUS		PAGE
1	Oestrus---Gad-Fly	61
2	Tipula---Crane-Fly	64
3	Musca---Fly	66
4	Tabanus	68
5	Culex---Gnat	69
6	Empis	72
7	Conops	72
8	Afilus	73
9	Bombylius---Buzz-Fly	73
10	Hippobosca---Horse-leech	74

VII. APTERA.

This order contains all such insects as want wings in both sexes.

It contains the following genera:

GENUS		PAGE
1	Lepisma	76
2	Podura---Spring-Tail	77
3	Termes	77
4	Pediculus---Louse	78
5	Pulex---Flea	78
6	Acarus---Tick	79
7	Phalangium	80
8	Aranea---Spider	81
9	Scorpio---Scorpion	83
10	Cancer---Crab	84
11	Monoculus	86
12	Oniscus	88
13	Scolopendra	88
14	Iulus	89

Class.

INSECTS.

ANTENNÆ 2. Legs 6 or more. They breathe through lateral spiraculæ.

I. Order—COLEOPTERA.

Wings 2. Covered by 2 shells; divided by a longitudinal future.

GENERA.

1. GENUS.—SCARABÆUS, BEETLE.

Antennæ clavated; their extremities fissile; five joints in each foot.

2. LUCANUS, STAG-BEETLE.

Antennæ clavated, compressed; pectinato-fissile. Maxillæ extended so as to resemble horns. Five joints in each foot.

3. DERMESTES.

Antennæ of three joints, clavated, perfoliated. Thorax convex. Head concealed under the Thorax.

4. PTINUS.

Antennæ sub-filiform, the joints toward the end longest. Thorax roundish, concealing the head.

5. HISTER.

Antennæ broken in the middle with a solid bulb at the end. Head retractile.

6. GYRINUS.

Antennæ clavated, stiff, shorter than the head. Eyes 4.

7. BYRRHUS.

Antennæ clavated, solid, compressed.

8. SILPHA.

Antennæ clavated, foliated. Head prominent. Thorax margined.

9. CASSIDA, HELMET-BEETLE.

Antennæ knotted, enlarging towards the end. Shells and thorax bordered.

10. COCCINELLA.

Antennæ knotted, truncated. Palpi longer than the Antennæ. Body hemispheric. Shells and thorax bordered. In each foot 3 joints.

11. CHRYSOMELA.

Antennæ knotted, enlarging towards the ends. Corselet margined.

12. HISPA.

Antennæ fusiform enlarging from each point to the middle; situate between the eyes, and placed so near at their base, as to seem to arise from the same point.

Thorax and elytra in general covered with protuberances or spines.

13. BRUCHUS.

Antennæ nearly filiform, the tip of each joint a little prominent in the inside.

14. CURCULIO.

Antennæ clavated, elbowed in the middle, and fixed in the snout, which is prominent and horny.

15. ATTELABUS.

Antennæ thicker towards the extremity. Head narrow behind. Four joints in each foot.

16. CERAMBYX.

Antennæ articulated, and tapering to the end. Shells long and narrow. Four joints in each foot.

17. LEPTURA.

Antennæ tapering to the end.

Shells narrower towards their extremity. Thorax of a roundish and slender make.

18. NECYDALIS, CARRION-EATER.

Antennæ setaceous, as in the foregoing genus.

Elytra

Elytra either shorter than the abdomen, or narrower, and of the same length with that part.

19. LAMPYRIS, FIRE-FLY.

Antennæ filiform.

Elytra weak and flexible.

Thorax flat, and of a semiorbicular form, surrounding and concealing the head.

Sides of the abdomen papillous and folded upwards towards the elytra.

Females, in general, want wings.

20. CANTHARIS.

Antennæ taper.

Thorax margined, and shorter than the head.

Shells flexible.

Sides of the abdomen edged with papillæ, or appendices, folded upwards, as in the preceding genus.

21. ELATER, SKIPPER.

Antennæ taper, lodged in a groove under the head and thorax; (*probably to preserve them from the violence of the fall; when it makes the singular leap which distinguishes it from all other insects.*)

22. CICINDELA, SPARKLER.

Antennæ taper. Jaws prominent, denticulated. Eyes prominent. Thorax roundish and margined.

In each foot 5 joints.

23. BUPRESTIS, COW-BURNER.

Antennæ taper, length of the thorax. Head half concealed.

24. DYTISCUS, DIVER.

Antennæ either taper; or encrease in size towards the end, and have a perfoliated capitulum or head.

Hind feet hairy, made for swimming, and armed with small claws.

25. CARABUS, BULL-HEAD.

Antennæ taper. Thorax and shells margined, the former is shaped somewhat like a heart, the point of which is cut off.

26. TENEBRIO, DARKLING.

Antennæ moniliform, or resemble a string of beads; the last joint rounder than the others. Thorax mar-

gined. Head porrected or stretched forwards. Elytra rather stiff. Some want wings.

27. MELOE, BLOSSOM-EATER.

Antennæ globular; the last globule oval. Thorax roundish. Shells soft. Head gibbous and bent downwards. Many want wings.

28. MORDELLA, NIBBLER.

Antennæ filiform, serrated, joints triangular. Head bent downwards. Palpi compressed, clubbed, and obliquely truncated. Elytra curved downwards towards their point.

29. STAPHILINUS, ROVE-BEETLE.

Antennæ globular.

Elytra not above half the length of the abdomen. Wings folded up and concealed. Tail defenceless; but has 2 vesicles which can be shot out at pleasure.

30. FORFICULA, EAR-WIG.

Antennæ tapering.

Elytra much shorter than the Abdomen. Wings folded and covered.



II. Order—HEMIPTERA.

Shells, or upper wings semi-crustaceous; not divided by a straight suture; but incumbent on each other.

Beak curved downwards.

GENERA.

1. GENUS.—BLATTA, COCK-ROACH.

Antennæ taper.

Thorax orbicular, margined.

2. MANTIS, SOOTH-SAYER.

Head unsteady, appears to be slightly attached to the thorax.

Antennæ setaceous.

3. GRILLUS, CRICKET.

Antennæ in some taper, others filiform. Head inflexed,

inflexed, armed with jaws, and furnished with Palpi. Wings folded, and concealed.

Feet armed with two nails, hind ones formed for leaping.

4. FULGORA, LANTERN-FLY.

Front drawn out, extended, and empty.

Antennæ seated below the eyes.

Rostrum inflexed, or bent inwards under the body.

5. CICADA, FROG-HOPPER.

Antennæ taper.

Shells membranaceous, declining along the sides of the body.

Rostrum bent inwards, under the breast.

6. NOTONECTA, BOAT-FLY.

Antennæ beneath the eyes, and shorter than the thorax. Feet formed for swimming, and hind feet hairy. Wings folded together crosswise.

7. NEPA, WATER SCORPION.

Antennæ, or forelegs cheliform. Wings folded together crosswise; fore part coriaceous; as in the last genus.

8. CIMEX, BUG.

Antennæ longer than the thorax. Rostrum inflexed.

Wings folded together crosswise. Back flat. Some are without wings.

9. APIIS, LEAF-LOUSE.

Antennæ longer than the thorax. Beak inflexed. Wings 4 erect, or none. Extremity of the Abdomen generally forked.

10. CHERMES.

Antennæ longer than the thorax; which is gibbous. Rostrum placed in the breast. Wings 4, deflexed. Skip.

11. COCCUS, COCHINEAL.

Trunk proceeding from the breast. Wings in the male 2 erect—females none. Four or six white bristles at the extremity of the abdomen.

12. THRIPS.

Antennæ as long as the thorax. Beak obscure. Body narrow. Wings 4, straight, narrow.

III. Order—*LEPIDOPTERA*.

Wings 4, imbricated with very minute scales.

Tongue or trunk spiral.

Body hairy.

GENERA.

1 GENUS.—*PAPILIO*, BUTTER-FLY.

Antennæ clavated. Wings, when at rest, erect.
Diurnal.

2. *SPHINX*.

Antennæ thickest in the middle. Wings, when at rest, deflected.

Fly morning and evening only.

Flight slow and heavy.

3. *PHALÆNA*, MOTH.

Antennæ taper from the base. Wings in general deflected when at rest. Fly by night.



IV. Order—*NEUROPTERA*.

Wings 4, naked, transparent, reticulated with veins or nerves. Tail without sting.

GENERA.

1. GENUS.—*LIBELLULA*, DRAGON-FLY.

Antennæ short.

Mouth armed with 2 long lateral jaws. Wings extended. Tail of the male forked.

2. *EPHEMERA*, DAY-FLY.

Antennæ very short.

Mouth has neither teeth nor palpi. Two protuberances before the eyes. Wings erect; second pair very small. Two or three tails like bristles.

Short-lived.

3. *PHRYGANEÆ*.

Antennæ longer than the thorax. Wings crossing each other; second pair folded so as to be concealed under the upper ones. Protuberances before the eyes 3. Palpi 4. No teeth.

4. HEMEROBIUS.

Antennæ longer than the thorax, taper, extended. Mouth prominent. Palpi 4. Teeth 2. Wings deflected, and not folded. Stemmata wanting.

5. MYRMELEON, ANT-EATER.

Antennæ club-formed, and as long as the thorax. Wings deflected. No stemmata. Mouth armed with jaws, 2 teeth, and 4 long palpi. Tail in the male has 2 straight filaments like foreceps.

6. PANORPA.

Antennæ longer than the thorax. Stemmata 3. Proboscis horny, cylindrical, 2 palpi at the end. Tail in the male furnished with a chela or weapon, resembling the claw of a crab, or the dart of a scorpion.

7. RHAPHIDIA.

Antennæ as long as the thorax ; the anterior part of which is lengthened out, and of a cylindrical form. Head of a horny substance, and depressed, or flattened. Mouth armed with 2 teeth, and furnished with 4 palpi. Wings deflected. Stemmata 3.



V. Order—HYMENOPTERA.

Wings 4, generally membranaceous. Tail of the females armed with a sting.

GENERA.

1 GENUS.—CYNIPS, GALL-FLY.

Mouth armed with jaws, but no proboscis. Sting, spirial, and mostly concealed within the body.

2. TENTHREDO, SAW-FLY.

Antennæ differing.

Wings extended, and look as if swelled, or of a bulky consistence.

Sting, ferrated, between two valves. Some are separated and termed *Crabro*.

Jaws but no proboscis.

3. SIREX, TAILED WASP.

Antennæ filiform above 20 joints. Two strong jaws. Palpi 2. Sting rigid, serrated, projected. Abdomen united to the thorax.

4. ICHNEUMON.

Antennæ of more than 30 joints; long, filiform, vibrating, sting within a bivalve sheath. Mouth armed with jaws, without tongue. Abdomen generally joined to the body by a pedicle.

5. SPHEX, SAVAGE.

Antennæ of 10 joints.

Mouth armed with jaws; no tongue. Wings extended, not folded, tail horizontally. Sting sharp and pointed, concealed.

6. CHRYSIS, GOLDEN FLY.

Antennæ filiform of one long and 11 short joints. Thorax joined to the abdomen by a short pedicle. Sting single. Wings not folded. Mouth armed with jaws; but no proboscis.

Body appears as if gilt.

7. VESPA, WASP.

Mouth armed with jaws. Wings, upper ones folded. Body smooth. Sting concealed.

8. APIS, BEE.

Mouth armed with jaws, and furnished with a proboscis inclosed in a bivalve sheath, and inclined downwards under the body.

Body hairy. Sting concealed.

9. FORMICA, ANT.

An erect scale between the thorax and abdomen.

Sting concealed. Males without. Males and females winged.

10. MUTILLA.

For the most part want wings. Body covered with a kind of down. Thorax strikes off bluntly at its base, or rises perpendicularly from the part where joined to the abdomen. Sting pointed and concealed.

VI. Order—DIPTERA.

Wings two.

GENERA.

1 GENUS.—OESTRUS, GAD-FLY.

Antennæ taper growing from a small point or button. No mouth but 3 punctures, without trunk or beak. Stemmata 3.

2. TIPULA, CRANE FLY.

Head long. Palpi curved. Proboscis short, and bent inward. Upper jaw like an arch.

3. MUSCA, FLY

Antennæ vary and mark the families. Mouth formed by a soft fleshy proboscis, with two lateral lips. No palpi.

4. TABANUS.

Antennæ conic, of 4 segments. Trunk fleshy, terminated by 2 lips. Palpi one on each side of the trunk.

5. CULEX, GNAT.

Antennæ of males feathered. Trunk a long slender syphon, or flexible sheath, enclosing setæ, or bristles, pointed like stings.

6. EMPIS.

Proboscis of a strong horny substance, bivalve, long and bent inwards.

7. CONOPS.

Trunk long, jointed.

8. ASILUS.

Rostrum hard, or horny, porrected, extended out its whole length, and bivalve.

9. BOMBYLIUS, BUZZ-FLY.

Trunk taper, very long, sharp, between two horizontal valves; in which are contained stings or bristles.

10. HIPPOBOSCA, HORSE-LEECH.

Antennæ like a single hair.

Rostrum bivalve, cylindrical, obtuse, and wavering or shaking, as if ill fixed. Feet armed with nails. Body flat, hard, and as it were scaly; hard to crush.

VII. Order—*APTERA*.

No wings.

GENERA.

1. GENUS—*LEPISMA*.

Legs 6. Palpi moveable.

Tails 3. Body scaly.

2. *PODURA*, SPRING-TAIL.

Antennæ long, taper.

Legs 6. Eyes 2, composed of 8 small ones. Tail forked, bent inwards under the body; elastic, and acts like a spring, by which the insect leaps.

3. *TERMES*.

Antennæ taper. Legs 6. Eyes 2. Mouth with 2 jaws.

4. *PEDICULUS*, LOUSE.

Antennæ length of the thorax. Legs 6. Eyes 2. Mouth producing a sting. Abdomen depressed, and as it were formed of different lobes.

5. *PULEX*, FLEA.

Antennæ filiform. Legs 6. Eyes 2. Trunk taper, inflexed, concealing a sting. Abdomen compressed.

6. *ACARUS*, TICK.

Antennæ (2 articulated tentacula) made like feet. Feet 8. Eyes 2, placed on the sides of the head, remote from each other. Rostrum pointed.

7. *PHALANGIUM*.

Antennæ, fixed to the fore part of the head; and made like the feet. Eight feet. Eyes two on the summit of the head, near each other; and 2 others on the side. Abdomen round.

8. *ARANEA*, SPIDER.

Feet 8. Eyes 8. Palpi 2, jointed. It is furnished with instruments for spinning.

9. *SCORPIO*, SCORPION.

Antennæ or palpi, claws on the head. Feet 8. Eyes 8. On the under side 2 instruments like a comb.

10. CANCER, CRAB.

Antennæ 4, beneath the eyes. Palpi 6, unequal; the 4 longer covering the mouth. Eyes 2, moveable, generally projecting from the head, or placed upon a stalk. Feet 8 (or 10 or 6) besides 2 *hands* terminated byclaws.

11. MONOCULUS.

Antennæ used in swimming and leaping. Feet made for swimming. Body covered with a crust, or shell. Eyes fixed in the shell, very near one another.

12. ONISCUS.

Antennæ taper, and bent. Body oval. Feet 14.

13. SCOLOPENDRA.

Antennæ taper.

Feet as many on each side as the segments of the body; not less than 24. Palpi 2, jointed. Body depressed.

14. IULUS.

Antennæ beaded. Palpi 2, jointed. Feet numerous, twice as many as the segments of the body; which is semi-cylindrical.

Species.

The next division is into species, which are numerous beyond all calculation: to instance only in one genus, namely *Ichneumon*: we are told that it contains 27 species.

The *Lepidoptera* Order contains only three genera; and Harris gives above four hundred species of British Insects in these three.